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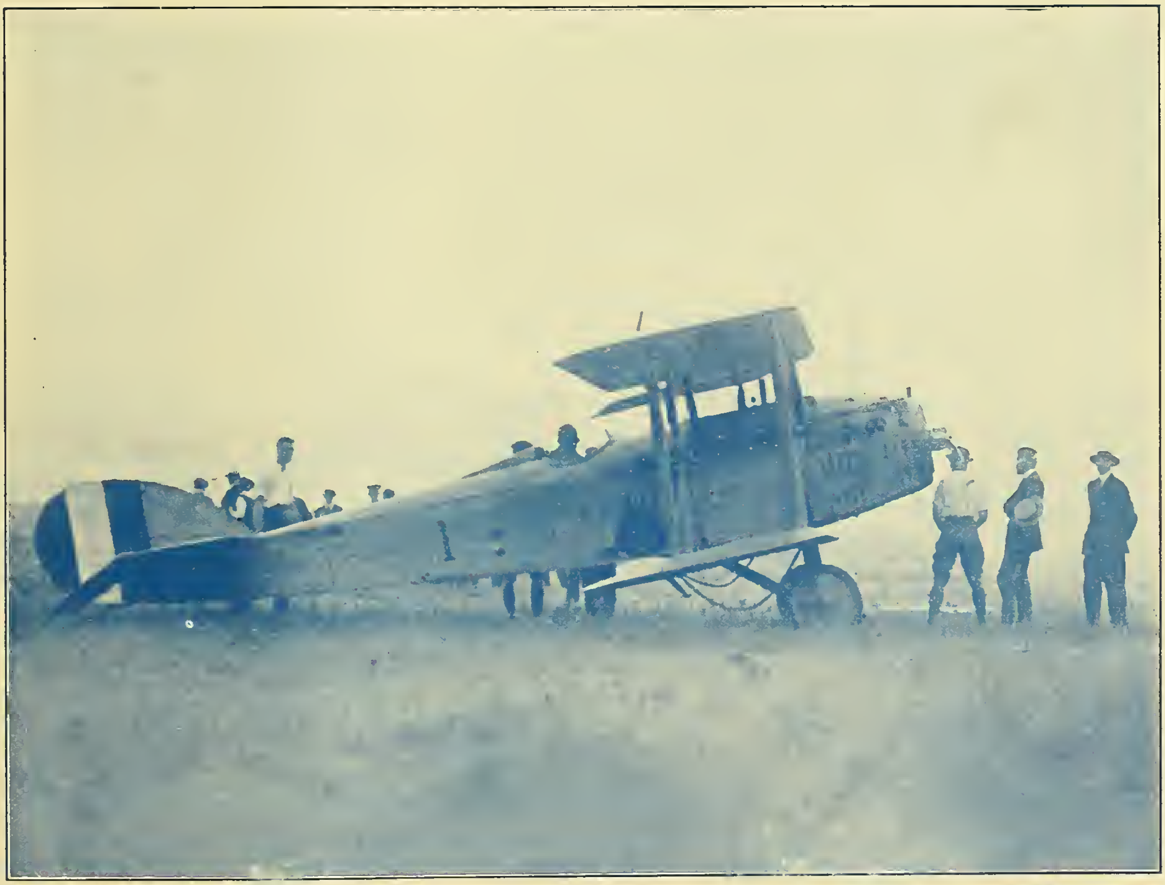
AERIAL AGE WEEKLY

Vol. 8, No. 1 SEPTEMBER 16, 1918 10 CENTS A COPY



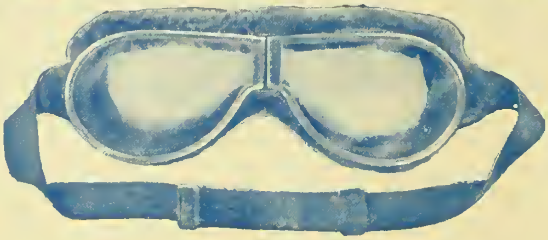
Max Miller starting on the pathfinding aerial mail flight New York-Cleveland-Chicago. (Standard plane equipped with 150 h.p. Hispano-Suiza)

Pathfinding Aerial Mail Flight to Chicago and Cleveland a Success

King of England Asks for More American Aircraft

NOTICE TO READER
When you finish reading this issue place a one-cent stamp on this notice, mail the magazine, and it will be placed in the hands of our soldiers or sailors destined to proceed over-seas.
NO WRAPPING — NO ADDRESS
A. S. Burleson, Postmaster-General

RESISTAL EYETECTS



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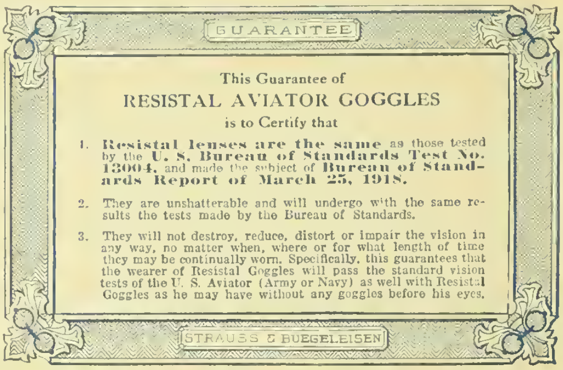

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2. They are unshatterable and will undergo with the same results the tests made by the Bureau of Standards.
3. They will not destroy, reduce, distort or impair the vision in any way, no matter when, where or for what length of time they may be continually worn. Specifically, this guarantees that the wearer of Resistal Goggles will pass the standard vision tests of the U. S. Aviator (Army or Navy) as well with Resistal Goggles as he may have without any goggles before his eyes.

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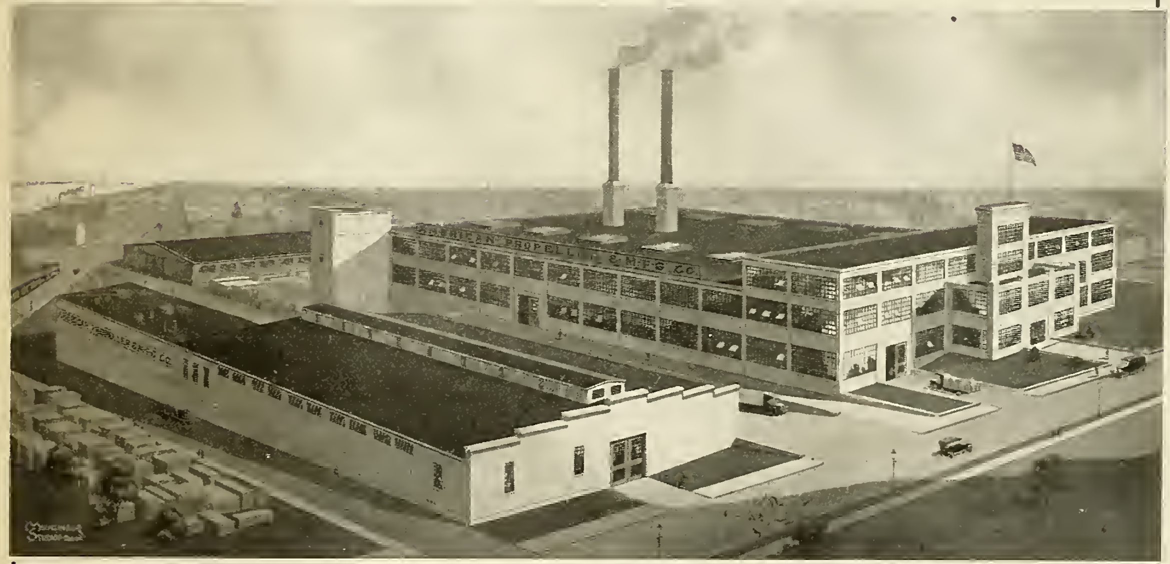

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AERIAL AGE
WEEKLY

VOL. VII SEPTEMBER 16, 1918 No. 1

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> **"Boiling tests and salt water soaking tests as follows were made on each specimen: Specimens were boiled for 8 hours, then baked for 24 hours at 100 deg. C.; specimens were soaked in salt water (4% salt by weight) at room temperature for 24 hours and then baked for 24 hours at 100 deg. C.**
>
> **"Results:—The glue held firmly in all tests. Neither the boiling nor the salt water soaking tests caused any indications of separations of the plies of the veneers tested."**
>
> **Dated, March 30th, 1918.**

Laminated wing beams of spruce. We have under contract a supply of aeroplane spruce and could undertake to manufacture 50 sets of 8 wing-beams daily. In an official Government report on a sample wing-beam section submitted by us for test, it was stated —

> **"Conclusion:—These beams carried a much greater transverse load than solid wood beams of the same material and section. The glue joints between web and flanges are stronger in shear than the web section, and the glue had fairly good waterproof qualities. These beams show the superiority of the laminated construction over the solid construction as to strength and great saving in material."**
>
> **Dated, March 11th, 1918.**

We offer single ply birch, maple, walnut, mahogany and red gum in sizes cut to order.

SHIPPER IN CAR LOTS OF

Spruce, Ash, Oak, Birch, Cherry and other manufactured aeroplane lumber.

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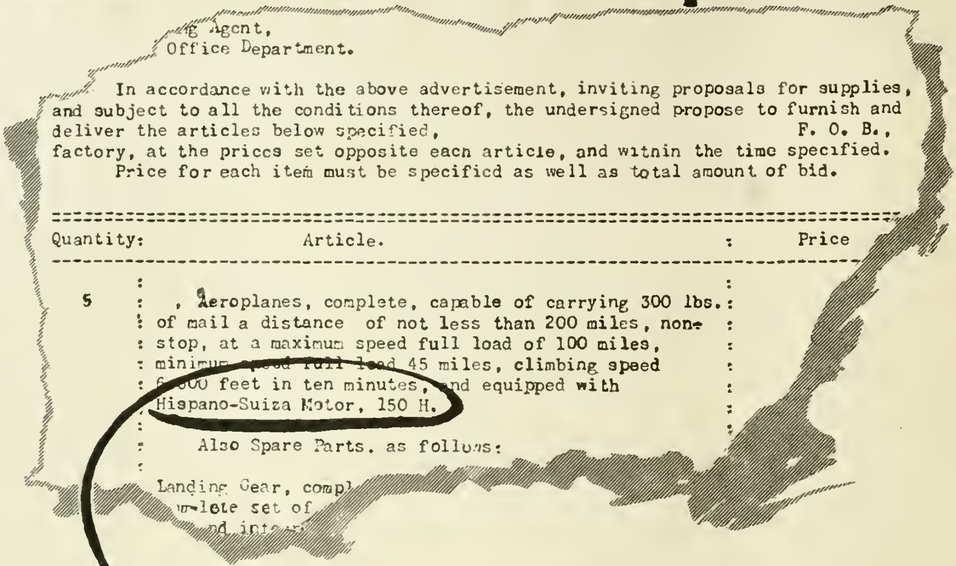
The U.S. Government Specifies—



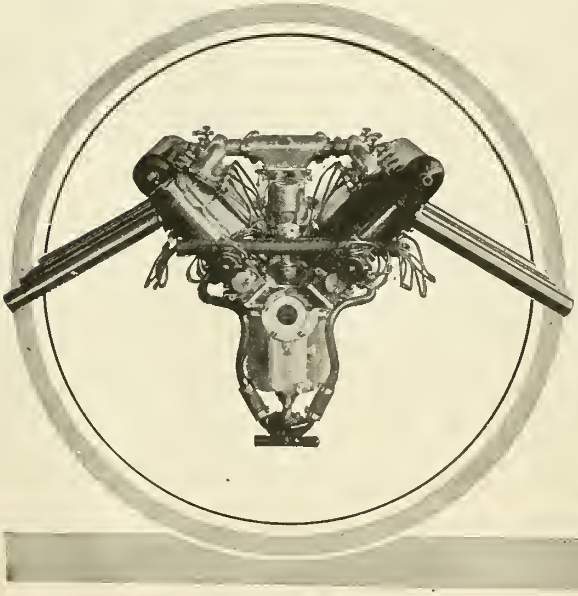
g Agent,
Office Department.

In accordance with the above advertisement, inviting proposals for supplies, and subject to all the conditions thereof, the undersigned propose to furnish and deliver the articles below specified, F. O. B., factory, at the prices set opposite each article, and within the time specified.
Price for each item must be specified as well as total amount of bid.

Quantity:	Article.	Price
5	, Aeroplanes, complete, capable of carrying 300 lbs. of mail a distance of not less than 200 miles, non-stop, at a maximum speed full load of 100 miles, minimum speed full load 45 miles, climbing speed 6,000 feet in ten minutes, and equipped with Hispano-Suiza Motor, 150 H.	
	Also Spare Parts, as follows:	
	Landing Gear, compl plete set of nd int	

GOVERNMENTAL recognition of the pre-eminent performance of the Hispano-Suiza Engine is again expressed in the United States Post Office requirements for high duty aeroplane mail service.

Hispano-Suiza Engine



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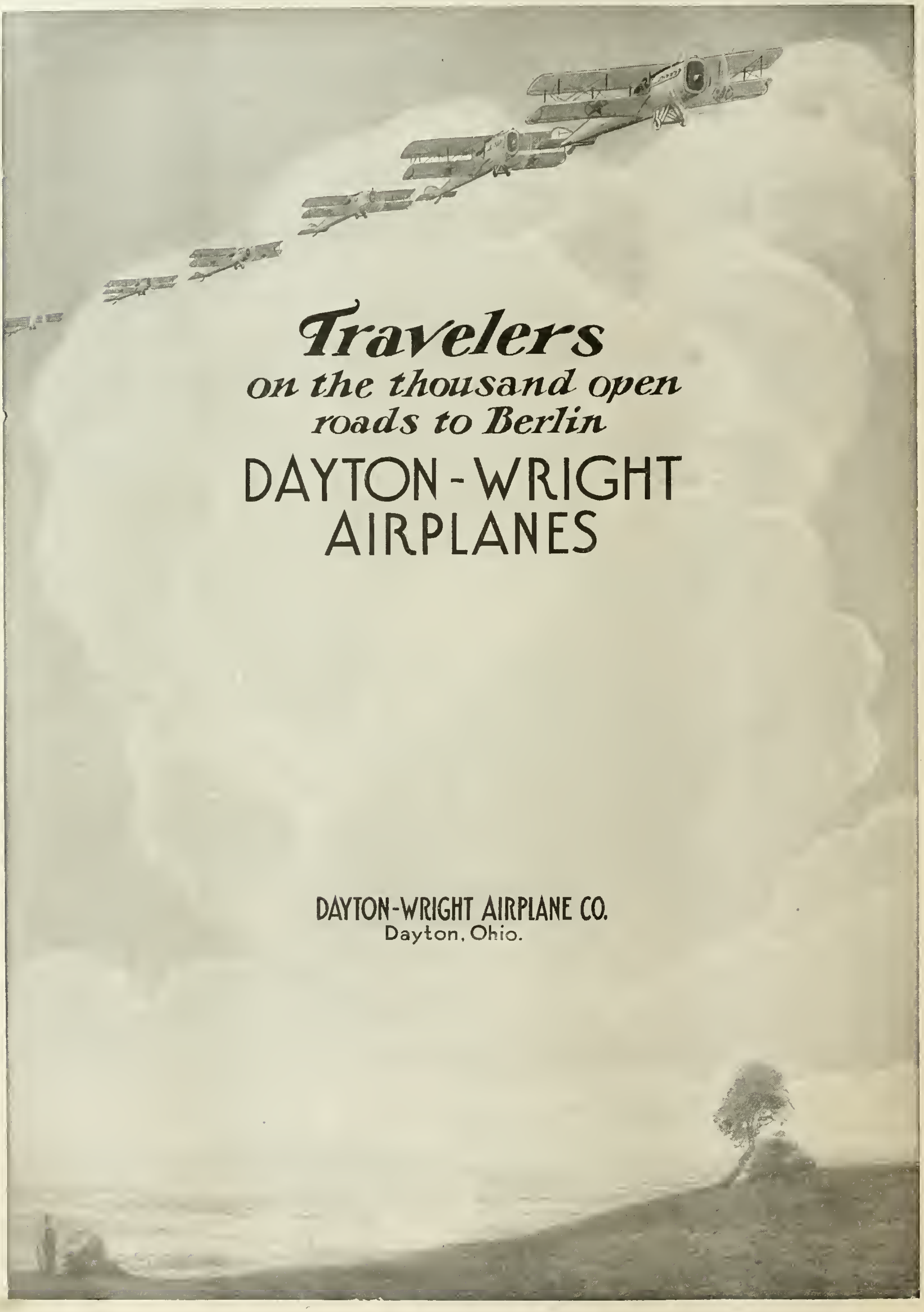

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on the thousand open
roads to Berlin

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VOL. VIII NEW YORK, SEPTEMBER 16, 1918 NO. 1

KING OF ENGLAND ASKS FOR MORE U. S. AEROPLANES

REPRESENTATIVE PADGETT, of Tennessee, chairman, and seven other members of the House Naval Affairs Committee, have returned from Europe enthusiastic over the work of the American Navy in the war zone. With Mr. Padgett were Representatives Hensley, Missouri; Farr, Pennsylvania; Venable, Mississippi; Browning, New Jersey; Connelly, Kansas; Riordan, New York, and Peters, Maine.

Representatives Hicks, of New York; Wilson, Texas, and Oliver, Alabama, who went over with the party, remained abroad for further observations. Representative Butler, of Pennsylavnia, another member, had returned previously.

"We examined into all the naval activities, including air stations," said Mr. Padgett. "The committee is much pleased with its inquiry. We found the naval situation excellent. We found splendid team work between the naval services of the United States and the Allied navies. We found the best of coordination between the American navy and the American army forces."

Representative Sherley, of Kentucky, chairman of the House Appropriations Committee, also returned from a trip to England and France. While away he inquired into the organization and handling of the American forces and materials overseas and conferred with officials of the Allied governments. He will give President Wilson the benefit of his observations within a day or two.

Representative Farr, of Pennsylvania, said **the King of England told members of the committee that he wished more aircraft would come over from America.** Premier Lloyd George said the American troops arrived in force just in time, while Premier Clemenceau of France, Mr. Farr said, declared that the American forces "not only brought punch but good luck."

"Our boys are doing wonderfully good fighting," continued Mr. Farr. "It was the recklessness of their dash that, at critical moments, overwhelmed the enemy. Aside from that they achieved themselves. They have put new courage and inspiration into the French and British.

"The destroyers we have over there are doing great work, but we need more of them.

"We need more aircraft, and then more. That is the cry that goes up from the Allied forces—send more aircraft."

SECRETARY BAKER AND JOHN D. RYAN IN FRANCE TO LOOK OVER AIRCRAFT SITUATION

SECRETARY OF WAR BAKER has arrived in France on a second mission in connection with the affairs of the American Expeditionary Force.

Formal announcement of the safe arrival of the Secretary and members of his party, who went abroad on a troop ship loaded with soldiers, was withheld until late September 8, following the receipt of official notice from France. It is now permissible to say that the Secretary sailed on Saturday August 31, and he crossed in approximately a week. It is apparent, therefore, that he went on one of the fastest transports.

Secretary Baker is accompanied by Second Assistant Secretary of War John D. Ryan, who is now in charge of all the army aircraft activities; also by Surgeon General Gorgas and Brig. Gen. Frank T. Hines, Chief of the Army Embarkation Service. Before leaving Washington he declined to indicate the purpose of his sudden trip, but said that this would become known after his arrival, when it could be assumed from the personnel of his party. There can be no doubt, therefore, that the primary matters in which Secretary Baker will interest himself while in France relate to aeronautics. medical and embarkation services.

The only official statement authorized regarding the mission of Mr. Baker was issued by the War Department on September 8 as follows:

"The Secretary of War has arrived in France on official business. News of the safe arrival of Mr. Baker and an official party was received at the War Department today. The voyage was made aboard a transport which carried the usual quota of United States troops. The Secretary was accompanied by John D. Ryan, Second Assistant Secretary of War; Major Gen. W. C. Gorgas, Surgeon General of the Army; Brig. Gen. Frank T. Hines, Chief of the Embarkation Service; and Lieut. Col. George H. Baird, Military Aide to the Secretary of War."

It is believed that the report filed by the sub-committee of the Senate Military Committee, which investigated allegations of failure in the American aviation program, served as the mainspring for Secretary Baker's sudden trip. This report was made public on August 22. Eleven days later Secretary Baker started for France accompanied by the man to whom the Administration is now looking, more than to any other person, for results in army aviation. On Saturday, August 25, the Senate Committee made public the testimony on which the Thomas report was based.

On Wednesday, August 28, Secretary Baker announced the selection of John D. Ryan to act as Second Assistant Secretary of War with full responsibility over the army's air service. At the time this announcement was made Secretary Baker and Mr. Ryan were packing their grips for the trip to France.

While they are in France it is expected that Secretary Baker and Mr. Ryan will go into a most careful inquiry into army aircraft matters, and that an effort will be made to reach a clearer view of the needs of the situation as viewed by General Pershing and American aviation experts and flyers abroad.

PATHFINDING AERIAL MAIL FLIGHT SUCCESSFUL, TO BE FOLLOWED BY PERMANENT LINE TO CLEVELAND AND CHICAGO

THE pathfinding aerial mail flight to Cleveland and Chicago, which was made without planning or spare machines has shown the thorough practicability of establishing a permanent aerial mail line between New York and Cleveland and Chicago, and such a service is to be established within a month.

The first trial has shown that with a few spare machines, or by employing twin-motored machines, mail can be sent from New York to Chicago and vice-versa in less than ten hours. Gardner actually made the Chicago-New York flight in 14 hours, including the stops at Bryan, Cleveland and Lock Haven!

The importance of the achievement is ably summarized in the following telegram sent to Chicago by the Aero Club of America authorities, to be read at the banquet given by the Chicago Merchant Association:

"Kindly convey the following message through Mr. Chas. Dickinson, the President of the Aero Club of Illinois, and through the President of the Merchants Association of Chicago and Postmaster Carlisle.

"The Aero Club of America wishes to express its hearty congratulations to Capt. B. B. Lipsner, Superintendent of the Aerial Mail, and to aviators Miller and Gardner upon the completion of the first pathfinding New York-Cleveland and Chicago Aerial Mail Flight.

"It was a splendid achievement in every way and has opened the way for the permanent Aerial Mail Line between New York, Cleveland and Chicago. We know that this achievement was accomplished with only few days of organization and that the weather conditions were most unfavorable. The Post Office deserves additional credit for having carried out this project under such adverse conditions.

"The people of Chicago and Cleveland are also to be congratulated for the promptness and their progressiveness in cooperating so fully in carrying out this flight, which is the forerunner of the permanent Aerial Mail Service between these cities. The aeroplane has cut down the distance between New York and Chicago to seven hundred miles and will cut down the time required to deliver mail and express to less than ten hours.

"Please also extend the Aero Club of America's hearty congratulations to General Kenly, the progressive and energetic Director of Military Aeronautics, and his aviators who have just successfully completed the three thousand mile flight, creating enthusiastic interest in aeronautics and in the war throughout the country.

"The Aero Club of America is proud of having had the privilege to cooperate in carrying out the Aerial Mail project, both because it is an epoch-making event and because of the progressive and cordial people connected with this undertaking.

"(Signed) ALAN R. HAWLEY, President,
"Aero Club of America."

The telegram from Chicago also praises the newly made maps of the Woodrow Wilson Airway, which was used by the aviators in flying from New York to Chicago.

Duplicate copies of the map were carried by the aviators, which will be returned to the Aero Club, signed by the aviators and postal authorities, and one copy will then be sent to President Wilson, one copy to Postmaster General Burleson, one copy to Postmaster Praeger, for the Government archives.

The map was made especially for use of aviators and only gives the features essential to aviators, on a scale suitable for the aviator who flies at 80 to 100 miles an hour, who would be confused by the average map.

The maps, which have been made under the direction of Messrs. Henry Woodhouse and Captain Robert A. Bartlett, the famous explorer, comprise seventeen sections, extending from New York to San Francisco. They have cost $6,000 to make, exclusive of the cost of printing.

The Woodrow Wilson Airway was named after President Wilson last year by the Aero Club of America, when the President signed the $640,000,000 appropriation for army aeronautics.

The Aero Club of America adopted a resolution to establish the Woodrow Wilson Airway and communicated the resolution to Congressman Murray Hulbert, who was prominent in conducting the campaign for the building of our aerial defenses, submitting the matter to President Wilson. The President's answer was as follows:

"My dear Mr. Hulbert:

'Thank you warmly for having let me see the enclosed telegram. It heartens me mightily. It is very delightful to have such a feeling exist and to receive such evidence of support and approval.

"Cordially and sincerely yours,
"WOODROW WILSON."

The Woodrow Wilson Airway represents a belt eighty miles in width, extending from New York to San Francisco. A line through the center of this belt touches the most important cities, through the States of New York, New Jersey, Pennsylvania, Ohio, Michigan, Indiana, Illinois, Iowa, Nebraska, Wyoming, Colorado, Utah, Nevada and California.

The Airway belt extends forty miles on each side of the line, so the air traveller can reach the extreme part of either side of the belt in half hour of flying. Any city or community located within this eighty mile belt will be designated as being on the Woodrow Wilson Airway. Landing places for aircraft and identification marks will be placed first in the important places in direct line of the Airway, then at the approach of every community.

The maps are made especially for the use of aviators and show land marks, elevations, and other important things which an aviator must know when he flies. Each section of the map has a corresponding chart giving the silhouette of the elevations of the land over the entire route.

The map also gives the compass directions, magnetic declination, the distance between cities, and other information of value to aviators.

Statement of Max Miller, Aerial Mail Pilot No. 1

I LEFT Belmont Field, Long Island, at 7:08 A.M., Thursday, September 5, with a good wind in back of me, flew over the City of New York, the Hudson River and Hoboken, and headed west 284 degrees.

There was a bank of low clouds near the ground and another layer of clouds at a high altitude. I kept right between them and flew on my compass course. I could not see the ground, but ran for about two hours and at ten o'clock I came down through the lower strata of clouds and landed one mile from Danville, N. Y., about 155 miles from New York City. There I inquired to find out my bearings and found that I was not more than two miles out of my course. I did not kill the motor, but left it running, and after five minutes started up again and headed for Lock Haven. I entered the fog which hung low over the ground and over the tops of the mountains, and I figured that it would take me about three quarters of an hour to make Lock Haven. I came down and saw the field through a notch in the mountains and made a good landing. My motor was missing, so I changed spark plugs which took me about an hour, filled up with oil and gas, got a couple of sandwiches, and left about 11:45 A.M.

I climbed up through the fog again and went on over the mountains. I sailed on my compass course for an hour, 283 degrees, and I figured I was about 100 miles further on. Then I came down to see where I was and get my bearings, and the first thing I knew I hit the top of a tree. That sure gave me a good scare. I hustled back up again into the fog, determined to get plenty of altitude and keep on going as long as my gas held out. I went fifty miles, and then I found my radiator was leaking and I came down and I saw a town with a fair going on. There was such a mob of people that I did not land there, but went on about twenty miles to a town named Cambridge. I inquired where I was and was told "Jefferson." On looking on my map I found a town called Jefferson lying to the north of my route, so on leaving I headed toward the south again in order to cross the route again; but I found that it was Jefferson County, Pa., instead of the town of Jefferson, Ohio, and I went about 150 miles out of my way before reaching Cleveland, where I had to remain all night on account of darkness. The next morning I got my radiator fixed and rested up after being buffeted about by the storm and rain, and got away at 1:35 P.M. for Bryan on the compass course of 275 degrees, a little south of due west about 140 miles. I had to stop several times to fill up my radiator with water. The weather was very much better, and I was able to make Bryan, where I was received by Postmaster Jordan and got away at 4:35 P.M. I skirted the southern shore of Lake Michigan, and arrived over Grant Park at an

(*Continued on page* 1313)

THE NEWS OF THE WEEK

American, French and Italian Aviators Help Lafayette Day Celebration

In spite of the severe weather conditions on Lafayette Day, the American, French and Italian aviators helped greatly to celebrate Lafayette Day in New York.

Thirty-six Allied aviators participated in the celebration, including Major Yeast, who lead the squadron formation; Major Baroetta, in charge of the French Aviation Commission; Captain Boyrivien, the noted French veteran aviator; Captain Bachellier, veteran French observer, attached to Mineola Headquarters for instruction of observers; Lieut. Parvis, the Italian Ace who has nine Austrians to his credit.

The squadron formation was led over New York from Mineola by Major Yeast, and gave some very remarkable demonstrations. The aviators dropped thousands of special cards bearing the pictures of General Foch and General Pershing and the American and French flags on the other side, with suitable expressions.

Lieut. Flashaire flew under all the New York bridges, repeating the recent performance of Captain Boyrivien.

Lieut. Parvis flew the American Caproni biplane equipped with three Liberty motors, which is now being tested and from which remarkable results are expected.

The New York public was greatly interested in the aerial demonstrations and once more is indebted to the Mineola aviators for a very interesting and educational entertainment.

Sixty Army Aeroplanes in 2-Hour Manoeuvre

Mineola, L. I., Sept. 9.—Sixty army aeroplanes of five different types, piloted by American airmen of the First Provisional Wing unit at Mitchel Field, today stayed in the air for two hours without a mishap while a series of moving pictures was taken to show the public the work of training a military flier. Thirty-six planes manoeuvered for several minutes in a huge battle formation with such skill that Major W. J. East, in command of the field, received congratulations from allied aviators who saw the exhibition.

Films of every stage of the work of making a military aviator were taken for the Department of Military Aeronautics, and will be sent to Washington to be distributed throughout the country. Some of the pictures were taken from the ground and others from aeroplanes flying at great heights singly and in battle formations. The photography was done by enlisted men in the Signal Corps who have taken courses in military photography at Columbia University.

Officers at the field said they did not think a larger number of military aeroplanes had ever taken to the air at the same time above a single field in this country. When plans were made for the flights there was some apprehension about safety, but the pilots handled their machines so skillfully that no machine was forced to the ground.

Among the planes in flight were the De Haviland 4, equipped with Liberty motors; the American-built Caproni, also with Liberty motors; the Curtis J. N. D. 4; the Curtis type H, with Hispano-Suiza motor, and the Thomas-Morse monoplane scouts.

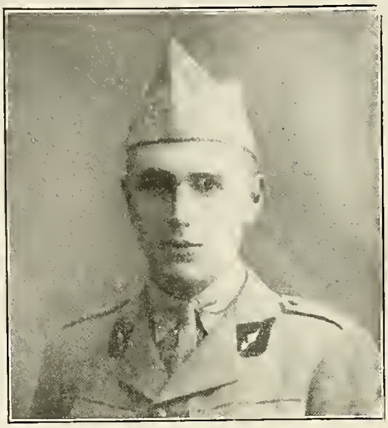
In the battle formation of thirty-six machines were several of the De Haviland machines of the type used by the American squadron on its first flight over the German lines in command of Brig. Gen. Benjamin D. Foulois. General Foulois had eighteen machines in his reconnoissance squadron. The large formation yesterday was in command of Lieutenant George Zeisner, flying at the peak. He commanded units of the machines in practice formations over New York City for several days.

The thunder of the sixty motors and the sight of the large number of machines in the air attracted thousands of spectators, and the roads were crowded with automobiles. All the other cadet fliers not in the First Provisional Wing and all the mechanics and officers at the field watched the manoeuvers with glasses.

After the films are developed they will be shown at the fields here to point out defects in flying to the men, and then will be taken to all the other grounds and flying schools in the country.

Aviators Dinner Guests of Manufacturers

Chicago, Ill.—As a part of the program of the Illinois Manufacturers' Association to stimulate interest here in the manufacture of aeroplanes and the obtaining of government contracts, a dinner was given in the gold room of the Congress Hotel in honor of visiting aviators. There were present about thirty officers of the air squadron which is taking a prominent part in the government war exposition.



Lieut. Thos. Hitchcock, Jr.

Among the speakers were General Charles F. Lee, head of the British aviation mission to the United States; Major General W. L. Kenly, director of military aeronautics of the United States Army; William B. Wilson, Secretary of Labor; Lieutenant Colonel C. K. Rhinehardt, commander of the flying circus, and Colonel George T. Buckingham.

Lieutenant Thomas Hitchcock, Jr., Who Has Escaped from Germany

Lieutenant Thomas Hitchcock, Jr., whose photograph is given above, has escaped from a German prison camp and has made his way over the border into Switzerland. He was captured on March 6th after an encounter with several German planes. He was wounded in the side and his machine fell behind the German lines. He was taken to Saarbrucken and later transferred to a camp in Bavaria. He escaped from there and walked about eighty miles to the Swiss frontier.

Before the United States entered the war he was known as a horseman and polo player. He tried to enlist in the American Aviation Corps, but was turned down on account of his youth. He went to France in June, 1917, and after training there he was assigned to the famous Lafayette Escadrille. He did not retransfer to the American forces. Last July he was made a lieutenant, though he was a prisoner at the time, in recognition of his work. He has the Croix de Guerre.

He is a son of Major Hitchcock of the Mineola Training Division. According to dispatches received he will not be interned in Switzerland and will come to the United States immediately.

Warns of Soldiers' Mail

Postmaster Patten issued a statement in which he called the attention to the ruling that soldiers' mail, both letters and parcels, must be specifically addressed.

The address on a soldier's letter must give the company, regiment and division to which he is attached.

Lieut. G. S. Touchard Dies

Toronto, Ont.—Lieutenant G. S. Touchard, former tennis champion and instructor in the Royal Air Force, died here suddenly at the General Hospital from an abscess of the brain. He entered the hospital to undergo an operation on his throat. His home was in New York City. He was a widower.

U. S. Fliers to Aid Canada

Ottawa, Ontario.—C. C. Balantyne, Dominion Minister of Naval Service, announced here the establishment of the Canadian Royal Naval Air Service, and declared that, thanks to America's aid, "machines are flyinig along the Atlantic Coast, ready to bomb hostile submarines, escort convoys and perform other services."

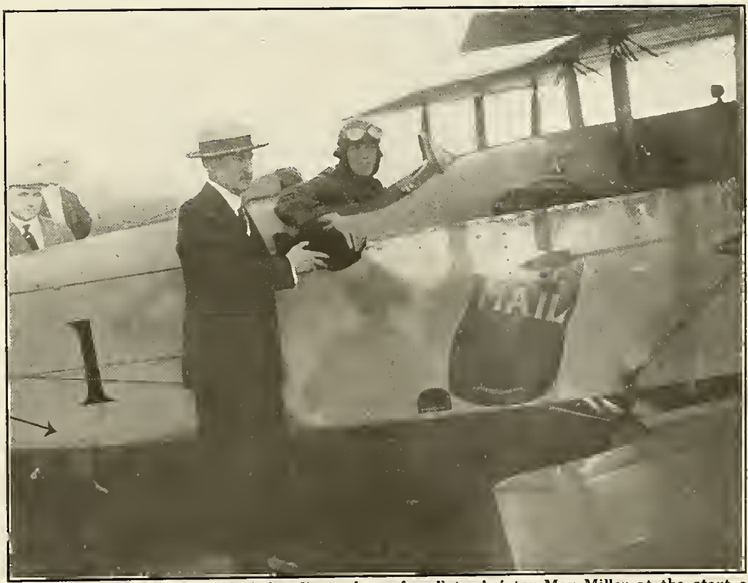
The United States, he said, had "consented to supply the personnel for Canada's Royal Naval Air Service until such time as a Canadian personnel could be properly trained to take their places."

Also, he said, the United States had supplied the necessary machines, which include aeroplanes, airships and kite balloons.

Our Own Planes Guard Our Men

Washington.—Confidential messages from General Pershing and other reports from France indicate that the American army now is supplied with sufficient aeroplanes of all kinds to protect its men in battle.

General March, chief of staff, gave this information to members of the House Military Committee at their weekly conference at the War Department.



Postmaster Patten of New York handing a bag of mail to Aviator Max Miller at the start of the New York-Cleveland Pathfinding Flight

Air Fighters to Use Cameras to Shoot

Dallas, Tex. The eye of the camera instead of rapid firing guns is being used to record direct hits on "enemy" planes by aviation cadets in Texas training camps.

After the great thrill of the first solo flight, the nose dive, the tail spin and the loop, blouses are discarded and a course of study in geometry, mathematics and physics is entered into by the cadets that far surpasses that of many a scientific school.

Days of drill and study, hot mornings at the rifle range, and then comes the first big lesson in aerial gunnery. But the cadet goes into the air armed with nothing more deadly than the camera to put into practice the knowledge he has acquired.

An aeroplane soars near by in the guise of an enemy ship and is snapped by the cadet, whose degree of accuracy is indicated by the nearness of the picture to the centre of the lens, which is marked in circles.

The school of aerial gunnery at Love Field is turning out fliers having a degree of accuracy that will give them great confidence once they reach the battlefields of France, officers declare. This accuracy comes only after the hardest study and practice.

For the actual ground practice a hill has been built back of the target range. Thousands of pounds of bullets already have been poured into it from students' guns.

A tiny wooden reproduction of an enemy plane is the object of this practice. The target is an unindicated spot on a nearby white sheet before which the plane, flying at a given speed, would be passing when the American plane's shots reached it. The student figures out the speed and the angle of ascension and distance of the enemy, adjusts his gun and aims at the tiny plane. Then if he is accurate in his shooting and his calculations the bullet should pierce the spot marked on the back side of the white sheet.

Students also are carefully drilled in the strategy of manœuvring into the one spot in the rear of the enemy plane whence he cannot shoot. From this position they can pour their own shots into the enemy.

American Flyer Outwits 14 Hostile Airplanes

With the American Army in France. An American observation plane while on a photographic flight was attacked on Sept. 7th by fourteen German planes. By skilful manœuvring the pilot brought the machine safely back into the American line.

British Seek Mechanics

A recruiting drive for mechanics in the British Royal Air Force, which was stopped recently because the number of men then desired had been obtained, will be resumed at once, according to a statement on Sept 5 by Colonel Lord George Wellesley at the British-Canadian Recruiting Mission, 220 West Forty-second Street.

The applicants must be British subjects who have registered at their respective local draft boards. Compensation will be $1.10 a day while in Canada, and if the men are required to serve overseas the British rate of pay will apply from the date of embarkation.

Norman van Hyning, instructor in lighter than air (Balloon and Dirigible) at the Naval Aviation school at Akron, Ohio

It was explained that the mechanics now sought are as follows: Blacksmiths, metal turners and machinists, carpenters and cabinet makers, coppersmiths, upholsterers, chauffeurs, engine fitters, photographers, wireless operators and watchmakers. Applications may be made at any British or Canadian recruiting mission.

Applicants for cadet vacancies are asked either to write or call in person on the first floor of the West Forty-second street mission.

Many Aeroplanes Ready

Washington. General March, the Chief of Staff, told members of the Senate Military Committee on Aug. 31 that reports received to date show that more than a thousand De Haviland aeroplanes have been completed or are in readiness to be turned over to the Government. He explained that of this number a large part had been shipped overseas to France for use by the Expeditionary Forces or have been sent to port for shipment overseas.

U. S. Pilots in Record Flight

A description of what is believed to be the longest flight made thus far by an entire squadron of battleplanes driven by American pilots abroad is contained in a letter just received here by Lieut. Leopoldo Belloni from Gianni Caproni, designer of the giant aeroplane bearing his name. The squadron of eight machines left the Caproni factories near Milan at 6 A. M. Shortly before noon they were all circling over Rome, having covered 450 miles in a little less than six hours.

The planes were all of the Caproni Ca 5 type, a reproduction of which fitted with twelve-cylinder Liberty engines is now being turned out in this country. Each machine carried a crew of five men. The commanding officers were Capt. La Guardia and First Lieuts. Mendel Hauch, William Agar and Mowat Mitchell.

The flight was made at an altitude of from 2,000 to 9,000 feet and the inhabitants of Bologna, Florence and Pisa caught their first glimpse of an American air squadron, which they cheered vociferously. Signor Caproni says the American pilots showed great skill in flying over such natural obstacles as the Apennine Mountains. The Italian press printed enthusiastic comments on the flight.

Ed. [illegible], aerial mail pilot No. 2, receiving a bag of mail from Postmaster Patten of New York at the start of the Pathfinding trip. (Curtiss plane equipped with Liberty motor) He made the Chicago-New York Flight in one day!

Say Allies Beat Germans

An Atlantic Port.—Several American and British officers belonging to the air forces in their respective armies arrived on Sept. 2 from the western front to give instruction to the cadets at the aviation camps in the United States. They declined to comment on the war except to say that the Allies were decidedly ahead of the Germans in aviation and artillery, and each infantryman had proved to be worth at least two of the enemy, including the much-advertised Prussian Guard.

Captain Lewis D. Boeree of Winnipeg, Man., who was on his way home suffering from shock through overflying, has officially brought down twelve Hun machines and has spent the last three months with the American soldiers on the western front. He said that he liked them immensely in every way, and it was a certainty that the American Army will continue to make its mark throughout the war.

Bolling Field to Be Improved

The Assistant Secretary of War has approved an allotment of $103,850 for improving and extending Bolling Field, Anacosta, D. C. This field is being enlarged for the aerial patrol and protection of Washington, as well as to meet the training needs of the Air Service officers in Washington. An additional hangar will be erected and quarters for twenty-three officers and 154 enlisted men provided. The high tension electrical wires at the southern end of the field and the drainage ditch, which are now dangerous to the flyers, will be removed. An aero repair shop and a machine shop will be erected and the whole field encircled by a high barbed wire fence. There will be a balloon station with one company located north of the flying field. The equipment will include captive balloons and free balloons for training observers. A photo developing hut for the developing and printing of aerial photographs taken in the vicinity, and a small radio telegraph station for the purpose of working up communication with aeroplanes while in flight will he additional features of the development of this aero flying field adjacent to the National Capital.

Painted Picture from Aeroplane

Sgt. First Class, Lawson Adams, Jr., in charge of the Landscape Department, is under orders for transfer elsewhere as a flying observer and official painter. When he leaves he will carry with him an aerial picture of Kelly Field just completed, the first canvas painted by an American using an aeroplane in the air as a viewpoint.

For several weeks Sgt. Adams has heen flying daily as an observer to obtain sketches for the painting which will hang in the office of the Director of Military Aeronautics, Washington, D. C.

Enlisting in September, 1917, Sgt. Adams served for a time in the North, then was transferred to Kelly Field, where he organized the Landscape Department, which has beautified roads and grounds around buildings all over the camp. He also designed the Italian Garden dancing pavilion at the Aviation Club, Flying Department.

Britain's Part

Mr. W. F. Massey, Prime Minister of New Zealand, last week, in giving a summary of notable happenings in regard to Britain's share in the war, which was altogether above her proportion, relative to the population, quoted the following figures as showing the Empire's tremendous effort:

Men in arms, 7,500,000.

Of these, England has given 4,500,000, or 60 per cent., Scotland, 8.3 per cent., Wales 3.7, Ireland, 2.3, the Dominions and Colonies 12. and India and dependencies 13.7.

Enemy aircraft brought down in twelve months: More than 4,000.

Bombs dropped on the enemy this year: More than 800 tons.

Raids into Germany in June: Seventy-four.

Naval tonnage: Increased from four to well over six millions.

Naval personnel: Raised from 145,000 to 420,000.

War expenditure to March last: £7,014,000,000.

(*Continued on page* 1331)

Hon. Albert S. Burleson, Postmaster General
Hon. Otto Praeger, Second Assistant Postmaster General
Captain Benjamin B. Lipsner, Superintendent Aerial Mail Division

US
AERIAL MAIL

AERIAL MAIL PILOTS

- Max Miller
- Maurice A. Newton
- Robert Sbank
- Ed. V. Gardner
- C. D. De Hart

George L. Conner, Chief Clerk to Second Assistant Postmaster Praeger
John A. Jordan, Special Representative
Frank Bowie, College Park, Md., Representative
Harry L. Hartung, Belmont Park, L. I., N. Y., Representative
Frank Praeger, Bustleton, Penn., Representative

AERIAL MAIL MECHANICS

- Henry Wacker
- E. N. Angle
- A. F. Cryder
- Ed. C. Radel
- Wm. C. Read
- W. O. Beatty
- Chas. King
- A. C. Danielle

(*Continued from page* 1310)

altitude of 5,000 feet at 6:55 P.M. I circled around and made a good landing and was received by Postmaster Wm. B. Carlisle, Mr. Chas. Dickenson, President of the Aero Club of Illinois; Capt. B. B. Lipsner, Superintendent of Aerial Mail Service; Mr. Thos. Downey, Assistant Superintendent of Mails; Mr. James O'Conner, Director of the U. S. War Exposition; Mr. James Stevens, Secretary of the Aero Club of Illinois, and Mr. Augustus Post, Secretary of the Aero Club of America, who had come on from New York to witness the inauguration of the first aero mail service between New York and Chicago.

The Return Flight

The weather on the return trip was much better. I started from Chicago on September 10, at 6:26 o'clock A. M. I carried about three thousand pieces of mail. The weather looked so good that I expected to make a record trip. There was some haze on the ground, but not nearly enough to prevent landmarks being distinct. Just as I was over Cleveland, I found a broken connection in the radiator and I landed there to have it repaired. This took some time, but I got away from there by 4:30 P.M., in time to make a pleasant flight to Lockhaven, one of the scheduled stops, before dark, a distance of 210 miles. I stayed at Lockhaven all night, leaving there at 7:20 the morning of the tenth. I arrived at Belmont Park at 11:22 A.M. As a pathfinding trip it was an immense success. We gathered a lot of information which will be very valuable in the future trips. The radiator trouble was the only thing that prevented me from making the trip within the ten hours set. If I had had a spare aeroplane even, I could have done it.

The First Trip

Pilot Max Miller is the first aviator to make the round trip, New York-Cleveland-Chicago-Cleveland-New York. On his arrival at Belmont Park, he made his report, and just one hour later started back on a flight to Washington, D. C.

Mr. Miller carried letters from Mr. Wm. F. Brooks, President of the Aero Club of Minneapolis, addressed to President Wilson in Washington, and Mr. Alan R. Hawley, President of the Aero Club of America, which has been brought from Minneapolis to Chicago by air, by Col. C. K. Rhinehart.

Mr. Miller left almost immediately for Washington, to carry the letter to President Wilson at the White House.

Mr. Miller says that the Aerial Mail Route to Chicago is entirely practical and feasible, and can be regularly maintained on a ten-hour schedule when relay aeroplanes are available at the different stations, or large aeroplanes with double motors are available for crossing the mountainous districts and where landing places are not easily found.

He found the air very good on his trip, and the winds were generally favorable. It was slightly hazy, but he could see the ground very well. The conditions which they encountered in going out were exceptionally stormy and such as would not ordinarily be met with.

STATEMENT OF EDW. GARDNER, AERIAL MAIL PILOT No. 2

I LEFT Belmont Park at 8:50 A.M., Thursday, September 5, 1918, two hours after Max Miller had started in a Curtiss R plane with a Liberty Motor, taking Radel, who was Miss Katherine Stinson's mechanic, with me, and carried three pouches of mail, containing about 3,000 letters.

The weather was very thick and the clouds were low, and I could not see the ground after attaining my altitude. I kept on my compass course, 284 degrees, and allowed for the drift of the winds. When I judged I was near Lockhaven, I came down and saw the river and two railroads at Bloomburg, and I knew that I was near Lockhaven. I kept on in the direction of Lockhaven, and very soon I saw through a split in the clouds a large new club house being built, and I saw a great number of people on the field, which I knew to be the Aerial Mail Station. I landed at 1:50 P.M., and spent 35 minutes in mending a broken gas line. Mr. Chas. A. Jobson, of the New York and Pennsylvania Company, did everything possible for me there, and I got away in the direction of Cleveland at 2:25 P.M.

I went on over the mountains in a terrific rainstorm and head winds, keeping the compass course of 283 degrees right over Franklin, and I was able to keep right on the course until I saw the race track just outside of Cleveland and the chimneys of a tile factory to the left, and beyond the landing field. I circled the field for some time, landed, and stayed there overnight.

Postmaster Wm. J. Murphy, of Cleveland, sent a message to Postmaster Wm. B. Carlisle, of Chicago, reading as follows:

"The people of Cleveland extend their most cordial greetings to the people of Chicago, appreciating that the Aerial Mail Service will increase the efficiency of the Post Office Department, and bring Cleveland, New York and Chicago into quicker and closer relationship."

I left Cleveland the next day and flew through to Bryan, where I arrived at 5:15. I met Postmaster Jordan, of Bryan, who was very enthusiastic and helped me on my way. I left at 5:50 P.M., and thought that I could get through to Grant Park before dark, but as I had not been on the field and knew that there was a great crowd of people at the War Exhibition and it was too dark to see, I landed at 7:20 at Westville, Indiana, 10 miles south of La Porte, and put up for the night. I left in the morning at 6:39 A.M., and flew across the southern end of Lake Michigan, landing at Grant Park at 7:30 A.M., where I found a warm reception awaiting me from Capt. B. B. Lipsner, Superintendent of Aerial Mail Division; Mr. Chas. Dickinson, President of the Aero Club of Illinois; Mr. Jas. Stevens, Secretary of the Aero Club of Illinois; and Mr. Augustus Post, Secretary of the Aero Club of America, who were on hand to welcome Radel and myself.

The arrival of the Aerial Mail at Chicago. Max Miller, Aero Mail Pilot Number 1, being greeted on his arrival with the first aero mail carried to Chicago. He is shown above (left) with Captain Benjamin B. Lipsner, Superintendent of Aerial Mail Services (right). Below are, from left to right, Mr. James S. Stevens, President Aero Club of Illinois; Mr. Dunlap, a pioneer aviator; Mr. Wm. B. Carlisle, Postmaster of Chicago; Mr. James O'Connor, Director of U. S. War Exposition; Augustus Post, Secretary of the Aerial League of America, and representative of the Aero Club of America. On the left are seen Captain Lipsner's sister and sister-in-law

Chicago to New York in One Day

I am glad that in my return trip I succeeded in making the Chicago-New York flight in one day. With spare aeroplanes it will be possible in the very near future to make the trip in less than ten hours, probably in less than eight.

I left Chicago September tenth at 6:25 A. M. with Ed Radel as mechanician, under fair conditions, and had no trouble in making Cleveland first and afterward Lockhaven in record time.

A month ago, with longer days, I could have made Belmont Park in daylight. I left Lockhaven at 5:51 P. M. and flew at about 7,000 feet most of the way. I never thought that I could miss Belmont Park, but night came along fast and it was impossible to distinguish one place from another. So, although I was over Belmont Park several times, I failed to land and continued flying over Long Island for close on to two hours when I was finally forced to land by a shortage of gasoline. I landed in a field close to Hicksville, Long Island.

As soon as arrangements are made to have electric lighting installed at Belmont Park field, flying at night will be fairly easy and it will be possible to start out or land before daylight or after dark at night, without any trouble.

I am told that I beat the best time of the fastest train from Chicago to New York by over ten hours. I am glad of it and am sure that in the very near future we will make the round trip in less time than is at present required by train to go one way.

Waiting for Gardner at Chicago

Mr. Max Miller was entertained at the Union League Club by Mr. Chas. Dickenson, President of the Aero Club of Illinois.

The mail was rushed to the Post Office in a special automobile and sent out by special messengers and delivered immediately. The Reception Committee waited on the grounds until they could hear from Edw. Gardner, who had left New York after Max Miller and was reported to have left Bryan at 5:50 P.M., that same afternoon, and was expected to land at Grant Park. Flares were prepared and lit on the field to enable him to make a landing, but a telephone mesage was received that he was forced to land at Westville, Ind., 10 miles south of La Porte at 7:20 P.M., and would come in the morning as the field was new to him and there were great crowds of people on the grounds, who had assembled to witness the Government War Exhibition. He arrived Saturday morning at 7:30 A.M., carrying 3,000 pieces of mail from New York City.

Saturday afternoon, Max Miller, Aerial Mail Pilot No. 1, took up Postmaster Wm. B. Carlisle for a beautiful flight over the City of Chicago and over the Federal Building, where the Post Office is situated. The Postmaster expressed himself as an ardent advocate of aeronautics and predicted that aerial mail service would be of tremendous value to merchants in the West when the regular aerial mail lines in all directions were fully established.

Max Miller started back from Chicago at 6 A.M. Monday, September 9, carrying 150 pounds of letters, making the run to Bryan, 160 miles, in one hour and five minutes, landing at 7:45 A.M., and continued his flight eastward at 7:50 A.M. He was forced to land five miles from Cleveland, at Woodland Hill Park, at 9:40 by a leaky radiator.

The AIRCRAFT TRADE REVIEW
N. E. J.

Dope Making Plants Nearly Ready

Washington.—Eight chemical manufacturing plants, built for the Bureau of Aircraft Production, estimated to cost $7,000,000, are now nearing completion. They will produce the necessary ingredients used in the manufacture of "dope" for coating aeroplane surfaces, immense quantities of which are used monthly, last month's supply alone running into 200,000 gallons.

There are two principal types of "dope" now in use in the U. S. Air Service: cellulose nitrate "dope," used on training planes, and cellulose acetate "dope," used on all planes shipped overseas. Acetate "dope," when properly made and applied, is believed to give a better, more permanent and less inflammable coating than nitrate 'dope." The characteristics of acetate "dope" are important in connection with the use on combat planes which are subjected to attacks with incendiary bullets.

Early in the preparation of the air program a standard "dope" was adopted and steps were taken to overcome the shortage of the ingredients and chemicals for the manufacture of cellulose acetate "dope." To-day, American plants, operating for the chemicals section of the Bureau of Aircraft Production, are turning out such materials as acetate of lime, methyl alcohol, acetone, glacial acetic acid and methyl ethyl ketone. From these materials "dope" is manufactured by several firms throughout the country for release through the chemicals section to plane manufacturers, aviation schools, fields and supply departments in this country and abroad.

The general method of doping the wing surfaces is to apply three or four coats of the "dope," intervals of several hours elapsing between the application of each coat. Because of the volatile nature of the thinners of solvents used to dissolve the "dope," the liquid portion evaporates quickly and the air in the vicinity becomes laden with the slightly injurious vapors of the solvents. On account of this evaporation the major portion of the solvents is lost, but steps have been taken to preserve the health of the workers and also to recover the solvent. Approved methods for recovery now make it possible to save from 50 to 85 per cent of the solvents lost during the process of doping and drying. Special "dope" containers are also provided which will reduce evaporation.

British Output of Aeroplanes

Writing in the War Anniversary Supplement of *Overseas*, Sir L. Worthington Evans, late Financial Secretary to the Ministry of Munitions, says: "British factories are now making in a single week more aeroplanes than were made during the whole of 1914, in a single month more than were made in the whole of 1915, and in a single quarter more than were made in the whole of 1916. The output for the whole of this year will be several times what it was during last year."

New Foot Warmer for Aviators

An electric foot warmer for the use of aviators, truck drivers, etc., has been invented by W. W. Lillard, 274 Monticello Avenue, Jersey City, N. J. Mr. Lillard, an electrical engineer, is at present on active service, and the invention is being promoted by Ernest J. King, of the same address.

The equipment comprises an insole of the same general appearance as the common slip insole, except that it has two plugs at the heel, which project about one-eighth inch from the bottom. These plugs are the terminals for the resistance wires or heating unit which is imbedded in the insole. When the insole is placed in the shoe the plugs fit snugly in two small sockets which are sunk in the heel about one-eighth inch.

There are two different ways for conducting current to the contact sockets in the heel. One consists in having two narrow metal strips extend along the outside of the sole from the heel for the distance of about an inch, these strips being adapted to make contact with contact plates in the foot board. The other method consists in bringing two very thin wires down the back of the shoe inside the back stay to the contact sockets, connection being made at the top of the shoe through two small snap-fasteners which are barely visible. A thin wire is fastened to the inside seam of each trouser leg, extending to the waist, where connection may be made with the electrical source. In making connection in this way there is absolutely no wire to get in a person's way

It is claimed that a person equipped with this device may keep his feet as warm as he wants to, and that when his feet are warm his whole body is warm. The heating element is intended to be operated from a 6-volt battery, and as each heating element has a resistance of about 6 ohms, the current consumption is only one ampere.

Overland to Make Liberty Engines

Elyria, Ohio.—The Willys-Overland plant in this city has announced it will begin the manufacture of eight and twelve-cylinder Liberty engines. The plant will operate twenty-four hours a day, giving employment to more than 2,000 men.

Giant Plane from St. Louis

St. Louis.—W. E. Workman, general manager of the Handley-Page Aeroplane Manufacturing Co., delivered a talk to members of the Chamber of Commerce at a luncheon in which he told of factories to be built in this country. Immediately after the luncheon a movement was started to raise $50,000 to build a giant plane here to fly to the war zone, where it will be offered in service. Some progress has been made in raising the fund.

A view of the interior of the Springfield Aircraft Company's factory

Personal Pars

E. M. Beach has been appointed to the position of inspection of the Bureau of Aircraft Production. He was formerly president of the Manufacturers Foundry Co., Waterbury, Conn., and also a member of the Board of Directors and Executive Committee of the Motor and Accessory Manufacturers Association.

B. A. Guy, secretary and assistant general manager of the Curtiss Aeroplane & Motors Corp., Buffalo, resigned August 15.

A. B. Walker has resigned as representative of the Budd Wheel Corporation, Philadelphia, to join the staff of the Bureau of Aircraft Production. He has left for an Eastern station.

Orrel A. Parker, formerly manager of the wheel department of the Hydraulic Pressed Steel Co., has gone to Washington to engage in government work. He is in charge of records under W. F. Parris, chief of the oil and lubrication branch, supply section, in the office of the director of military aeronautics.

Increased Their Equipment

Continental Auto Parts Company of Knightstown, Indiana, has recently increased its capital stock from ten to fifty thousand dollars, and is now making extensive additions to its plant and installing additional machinery and equipment in order to take care of its Government contracts.

The company manufactures a line of shop and factory equipment and it has been necessary to greatly increase production on the Continental Motor Stand, which is being used by the Department of Military Aeronautics, the Navy, Quartermaster and Ordnance, and the various manufacturers now making aeroplanes, trucks, tractors for the United States Government.

List of Purchase Contracts Made by Bureau of Aircraft Production

The following is a list of purchases contracted for by the Bureau of Aircraft Production:

[NOTE.—The first number at the beginning of each paragraph is the Order Number, the second is the Contract Number.]

730146. 4414. Zenith Carbureter Co., Detroit, Mich., 50 sets No. 48 D. C. carbureter and spare parts for the Hispano-Suiza 150 horse power, Type A engine.

730147. 4415. The Silver Co., South Bethlehem, Pa., 25,000 spark plugs for use on Hispano-Suiza Type A, 150 horse power engine.

August 3, 1918

30035—A—1. 2129—3. Ford Motor Co., Detroit, Mich., spare parts according to "M" and "L" lists for 5,000 Liberty engines.

180007. 4413. The Simplex Wire & Cable Co., Boston, Mass., 3,000 miles field wire.

710107. 4423. Eastman Kodak Co., Rochester, N. Y., 50,000 gallons cellulose acetate dope.

710108. 4425. Standard Seamless Tube Co., Ambridge, Pa., 70,500 feet seamless steel tubing.

710109. 4421. Bordentown Steel & Tube Co., Bordentown, N. J., 54,500 feet seamless steel tubing.

720214. 4424. B. F. Goodrich Co., Akron, Ohio, 10 supply balloons.

August 15, 1918

140024. 4426. W. N. Matthews & Bro., 620 Southern Building, Washington, D. C., 5,000 breast reels, without spool.

370100. 4429. Wayne Oil Tank & Pump Co., 1337 Meridian Place, Washington, D. C., 93 portable oil tanks.

470115. 4432. J. C. Pushee & Sons, Boston, Mass., 20,662 brushes.

480048. 4438. Continental Car Co. of America, Louisville, Ky., services in connection with crating 350 machine-shop truck bodies.

710104. 4420. Standard Aircraft Corporation, Elizabeth, N. J., 60,700 feet gauge seamless steel tubing.

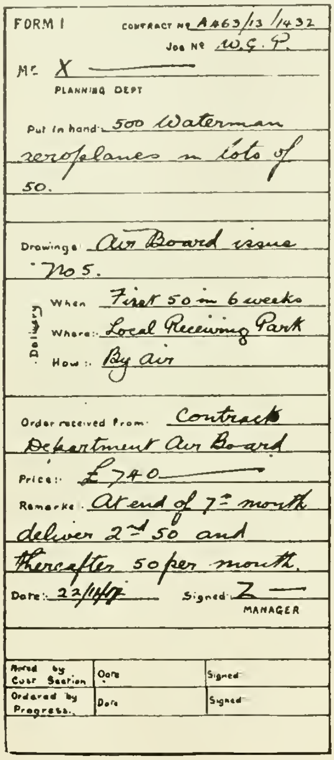
720218. 4431. Curtiss Aeroplane & Motor Corporation, Buffalo, N. Y., 40 sets wings, upper and lower, right and letf, complete.

750027. 4428. Unit Construction Co., Fifty-eighth Street and Grays Avenue, Philadelphia, Pa., 2,700 air fans for driving 100-watt generator used on radio telephone combination transmitting and receiving set.

SHOP ORGANIZATION: A SIMPLE SCHEME*

By W. E. JOHN

IT is my object to sketch the outline of a scheme for the organization of a factory. I neither pretend, nor is it my aim, to exhaust the subject, but shall apply the scheme to a modern factory, and hope so clearly to outline it, that it may be at least of some interest to the members. I may add that I have assisted in the mapping out and starting of two or three schemes or systems of organizations in England. A few days ago I was glad to read in a letter from an old "half section" of mine—a manager of a well-known motor-car factory and now engaged on aeroplane engines, high explosive shells, motor war lorries, etc., in which he says, "It would do your heart good to see the easy and complete way the system which cost us so many long hours hammering out last year is now working. Visitors from other factories are frequently coming to see it in operation."



FORM 1 CONTRACT Nº A A63/13 /1432
Job Nº W.G.P.
Mr. X —
PLANNING DEPT
Put in hand: 500 Waterman aeroplanes in lots of 50.
Drawings: Air Board issue No 5.
Delivery When First 50 in 6 weeks
Where: Local Receiving Park
How: By air
Order received from: Contract Department Air Board
Price: £740—
Remarks: At end of 7th month deliver 2nd 50 and thereafter 50 per month.
Date: 22/11/17 Signed: Z — MANAGER

Noted by Cost Section	Date	Signed
Ordered by Progress.	Date	Signed

In order to illustrate the working, and in particular the flexibility of the scheme, I shall consider it applied to a factory producing aeroplanes. It will be sufficient if we consider the engine to be supplied complete and the machines made to Government orders.

At the beginning, it must be clearly understood that for successful control we must have management, and that means the existence of a real manager.

As is the manager, so will be the firm. If the manager does not take his own medicine—or, in other words, does not obey his rules, *i.e.*, the rules of the factory, framed and posted under his signature—then the whole concern will show lack of control. A manager's great qualification for his post should be that he can manage.

This question of management cannot be too strongly put. A manager to manage men must be a man in every sense of the word.

Now to the scheme; in the smallest or the largest concern, we must have a planning department. In the smallest concerns this department may occupy but a small part of the manager's brain and have very little visibility, but in a concern of any magnitude the planning department is very important.

The department should be divided into two sections—the commercial section and the productive section—or, more conveniently termed the costing section and the progress section. We have a cost department and sometimes a progress department in every works, but too often they are at loggerheads and have little in common with one another.

The man in charge of the planning department should have had a sound broad training and have ample initiative to meet emergencies. He should be capable of uniting the cost to the progress of the work. He should, of course, be strongly backed by the manager.

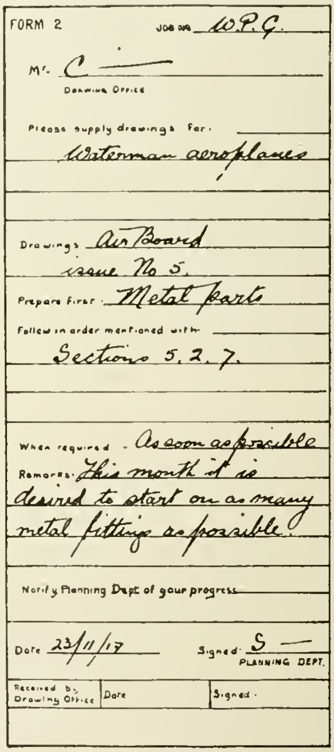
Aeroplanes are admitted to be a very difficult product for a factory, because of the number of parts of widely different materials which go to make up the complete unit, and because of the constant minor changes which are occurring in their design. They are, however, not unique in this latter respect, as those engaged in the production of various other munitions can testify.

We shall assume that an order has been received for 500 aeroplanes to be delivered in lots of 50; also that the price is considered satisfactory and that the factory is in a position to execute the order. We will call the aeroplane the "Waterman" type.

Once the order is received—through the post, by telephone, or otherwise—it must at once come to the manager, who should himself sign the order to the planning department for the work to be executed in the factory.

The order signed by the manager should be in duplicate, one copy for the planning department and one for the file.

It will be noted that the Government order number is dropped for obvious reasons and a factory number substituted, and, for convenience, each 50 has its proper symbol. WGP in lots of 50 will mean, to the initiated, an order for "W" type machines. G.H.I.J.K.L.M.N.O.P. lots of 50, or a total of 500. The first lot of 50 will be "WG," the second "WH," and so on.



FORM 2 JOB No. W.P.G.
Mr. C —
DRAWING OFFICE
Please supply drawings for: Waterman aeroplanes
Drawings Air Board issue No 5.
Prepare first: Metal parts
Follow in order mentioned with: Sections 5, 2, 7.
When required: As soon as possible
Remarks: This month it is desired to start on as many metal fittings as possible.
Notify Planning Dept of your progress
Date 23/11/17 Signed: S — PLANNING DEPT.

Received by Drawing Office	Date	Signed

For convenience in handling and filing, all forms in use should be on the same size card or paper. They may, however, be distinguished by different colors. If the factory uses a system of time cards and clocks, with a card measuring 7 in. by 5 in., this size should be used for the order forms, for reasons which will be apparent hereafter.

The cost section of the planning department should first receive the order, and should at once open an account and make notes of the various particulars of importance to them. Having done so, the clerk responsible for the entry should sign and date the order.

The planning department now proceeds to justify its name, and at once arranges for production to commence in the works. In the first place, arrangements for the drawings should be made.

The whole machine is sectionalized—wings, fuselage, undercarriage, etc., forming each a section. Preferably, the sections should be limited to nine, to fit in with the numbering scheme hereinafter dealt with. A section of the aeroplane is next selected, preference being given to the section which will take the longest time for its production. It is minutely sectionalized and its parts properly scheduled. A copy of this schedule should be sent to the order office.

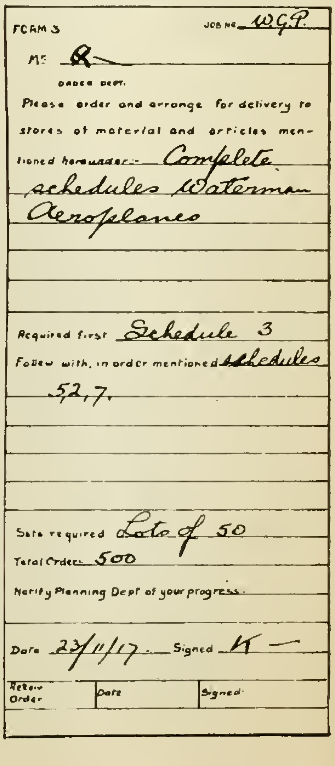
The parts which require to be bought outside complete are clearly marked on the schedule. It will be the duty of the order department to see that the rough material is actually in the stores at the earliest possible moment. The order department must clearly recognize that their duty does not terminate with the ordering, but with the actual delivery. They will also keep the planning department advised of their progress, item by item, if necessary. It is quite possible that a lot of material required for the job is already carried in stock, and the order department must advise the planning department of the position in this connection.

Meanwhile the planning department should have mapped out the production and allocated the work to the various departments. Forms for the production of each item, and in a number of cases, the part production of each item, are prepared In fact, every operation of each part is provided with a written order. This may appear to be a stupendous task, but a moment's consideration will show that it is always done, but that, in a large number of cases, the work of wiring these forms is scattered throughout the works, such as at the desks and offices of foremen and charge hands.

These order forms are preferably made out in duplicate, one copy is filed and the carbon copy is conveniently made on the back of the clock job card above referred to. The number or name of the department in which the work is done is filled in, and in fact every other item, of course, left to the discretion of the foreman. An order for the material required from the stores is also made out and attached to the production order.

It will be noted that there are two stores mentioned. (1) The rough stores, and (2) the departmental stores; the nature and reason for these stores will appear later.

The foreman in the department concerned will



FORM 3 JOB No. W.G.P.
Mr. Q—
ORDER DEPT.
Please order and arrange for delivery to stores of material and articles mentioned hereunder:— Complete schedules Waterman Aeroplanes
Required first Schedule 3
Follow with, in order mentioned Schedules 5,2,7.
Sets required Lots of 50
Total Order 500
Notify Planning Dept of your progress.
Date 23/11/17. Signed K —

Retain Order	Date	Signed

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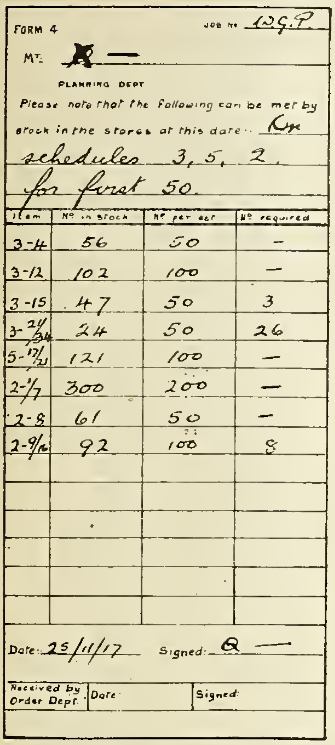
* Paper read before the Aeronautical Society on March 14, 1918.



FORM 4 JOB Nº W.G.P.

Mr. X —

PLANNING DEPT

Please note that the following can be met by stock in the stores at this date [illegible]

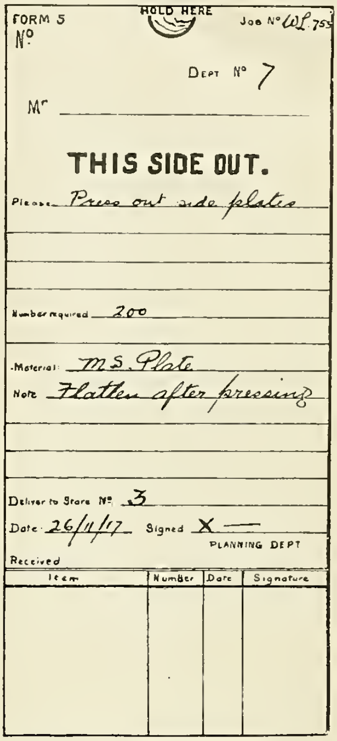
schedules 3, 5, 2.

for first 50.

Item	Nº in stock	Nº per set	Nº required
3-4	56	50	–
3-12	102	100	—
3-15	47	50	3
3-24/34	24	50	26
5-17/21	121	100	—
2-1/7	300	200	—
2-8	61	50	–
2-9/16	92	100	8

Date: 25/11/17 Signed: Q —

Received by Order Dept.	Date	Signed:



FORM 5 HOLD HERE Job Nº WL.755

Nº

Dept Nº 7

Mr

THIS SIDE OUT.

Please Press out side plates

Number required 200

Material: M.S. Plate

Note Flatten after pressing

Deliver to Store Nº 3

Date 26/11/17 Signed X —

PLANNING DEPT

Received

Item	Number	Date	Signature

be furnished with these orders by the planning department whenever the latter arrange for the work to be done, but never before they know that the requisite material is available in the stores. As the men under the foreman require work, he will fill in their number (or name and number if required) on the forms, and hand same to them. They will "clock on" the back of Form 5 and take Form 6 or 7 to the stores, draw the material and sign the receipt for same. On the completion of the job, the parts completed will be delivered to the proper stores and the receipt for same signed. All forms will be returned to the planning department, so soon as they are completed, and the duplicate on file can then be destroyed. Until destroyed, these duplicates form a record of the work in progress and an automatic check against the loss of any job.

Where the rule exists to check and balance the job and time cards weekly, it will be necessary for the foremen in the different departments to have duplicates made of all job cards carried over to the following week and the card so continued should be suitably marked, preferably they should be of a different color to the ordinary job card. In this case also, all job cards will pass through the timekeeper's department for checking with the time cards before they go back to the planning department.

Should any "scrap" be made, extra material would be requisitioned through the planning department, who may issue a further order on the stores. Preferably, such orders should be on a distinctive colored paper, so that they may be picked out as orders for replacement for "scrap." Too much attention cannot be drawn to this matter if economical production is to be attained.

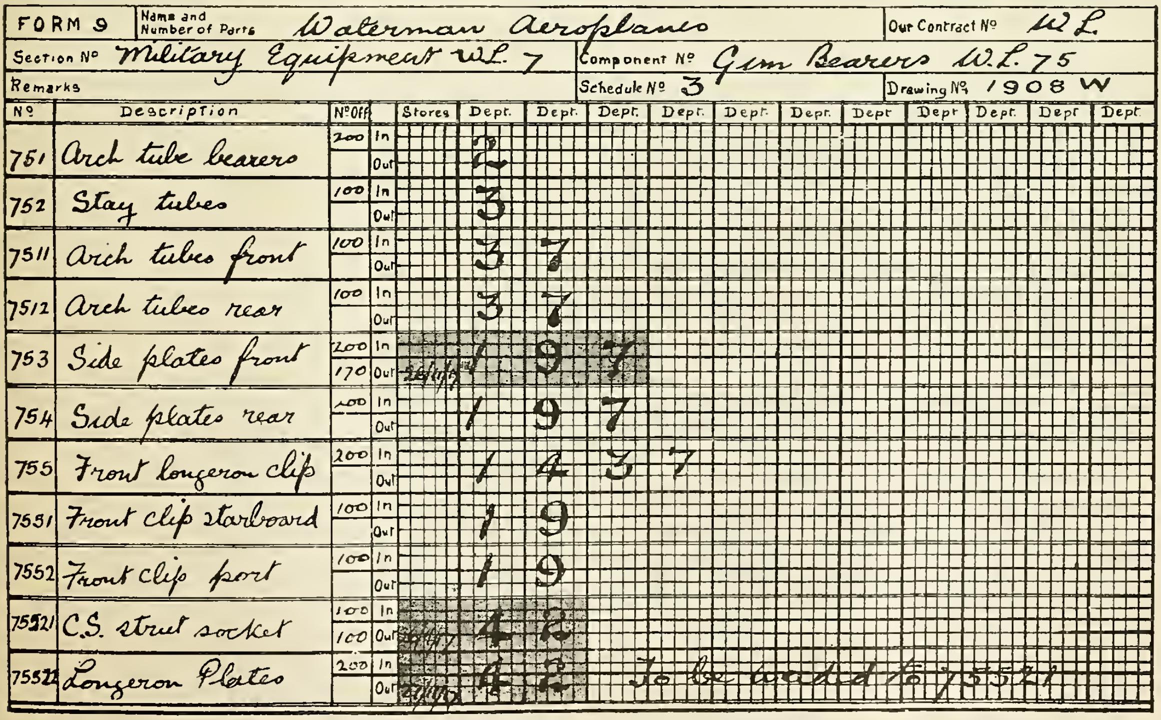
In order to record progress of work, use should be made of some chart. A convenient size for the card is 8 in. by 5 in. Some cards should have extra space on the back to accommodate components having an exceptional number of parts, or duplicate cards may be used for the same purpose.

Full information regarding the component and its proper classification is provided on the top of the card. The items are enumerated and, if necessary, the drawing number of each is given. A number of spaces is provided opposite each item and these are used for the different operations. The first column is headed "Stores," and the other colmuns are for the various departments in which the operations are to take place. Each department is conveniently indicated by a number permanently assigned to it. The number indicating the department should be written in red ink as large as possible. See Form 8.

Each space is divided by a horizontal line and each space so formed is again sub-divided by a horizontal and four perpendicular lines, thus providing two blocks of ten small sections to each space.

Shading with lead pencil the ten sections at the top of the horizontal line will show at a glance that the total number of the particular items called for have been received by the department indicated; whilst the shading of the sections below the horizontal line will indicate that the work on the items has been completed in the particular department and deposited in the proper stores, and that the job card has duly returned to the planning department. The date on which the particular movement of the item occurred, may be noted in ink over the shading. If, for any reason, the requisite number of any item is not received or produced by any department, the position can be shown by the number of sections shaded or parts of sections.

For instance, department 1 received material for the production of 200 side plates; owing to "scrap" 180 were produced, consequently only nine of the ten sections are shaded. As the "scrap" is not to be made up, the 180 are passed on to department 9, and this is shown by the shading of nine spaces only. Department 9 also makes "scrap" and thereby loses 10, consequently only 8½ sections are shaded, showing



FORM 9	Name and Number of Parts Waterman Aeroplanes		Our Contract Nº W.L.
Section Nº Military Equipment W.L. 7		Component Nº Gun Bearers W.L. 75	
Remarks		Schedule Nº 3	Drawing Nº 1908 W

Nº	Description	Nº Off In	Nº Off Out	Stores	Dept.	Dept.	Dept.	Dept.	Dept.	Depr.	Dept	Dept	Dept.	Dept	Dept
751	Arch tube bearers	200			2										
752	Stay tubes	100			3										
7511	Arch tubes front	100			3	7									
7512	Arch tubes rear	100			3	7									
753	Side plates front	200	170	26/11/17	1	9	7								
754	Side plates rear	200			1	9	7								
755	Front longeron clip	200			1	4	3	7							
7551	Front clip starboard	100			1	9									
7552	Front clip port	100			1	9									
75521	C.S. strut socket	100	100	[illegible]	4	2									
75522	Longeron Plates	200		[illegible]	4	2	To be welded to 75521								

170 side plates passed on by this department.

Referring again to the first column, *i.e.*, the stores record, the top spaces are shaded when instructions for ordering the material have been sent to the order department. The lower spaces are shaded when the planning department has been notified that the material is in stock. The date in this space should show when the orders for the work to be put in hand were sent to the shop.

If desired, the progress card may be smaller in size and one card assigned to each item. If this is done, a ready means is provided for seeing at a glance the amount of work in progress in each department. This will be described in detail later.

It is now necessary to mention the system employed for numbering the various jobs. This is an adaptation of the decimal system in use in some libraries.

No doubt members have had some experience of the long official numbers used by the Government to designate their contracts. A number like A463/13/1432 will serve for an example. To saddle a job, and all the parts of it, with a number like this, is asking for trouble. Its use means loss of time, worry through mistakes and consequent loss of output. I believe "every little helps" in the question of output, and that, whether one is to save time in the production of battleships, aeroplanes, or packets of matches, every moment saved is a moment gained. A few moments' thought will convince anyone acquainted with the records necessary in even a small factory, that the aggregate of the time wasted in writing the long numbers such as that mentioned above must run into days.

As already stated, my method is to give the contract a certain letter. A contract for a number of "Waterman" aeroplanes is given the letter "W" and if we sub-divide the number into lots of, say, 50 each, each lot is given a second letter as "WL." The unit required in the contract—in the example under consideration, the aeroplane—is divided into a number of sections, but not more than nine, and subsequent sub-divisions are limited to ten, and are numbered consecutively, as:—Wings 1, centre section 2, fuselage 3, tail 4, undercarriage 5, power plant 6, military equipment 7, struts and bracings 8, controls and instruments 9.

Each section is divided into components limited to ten. For instance, the military equipment section number WL7, is divided into:—Gun complete 1, magazine case 2, ejector funnel 3, control gear 4, bearers 5, wind screen 6, sight 7.

Each component is sub-divided into parts. Take for example the gun bearers. These, numbered WL75, would be divided into:—Arch tube bearers 1, stay tubes 2, side plates front bearer 3, side plates rear bearers 4, front longeron clips 5, rear longeron clips 6, fork piece 7, bolts 8.

Each part is further divided into items, thus the front longeron clips, numbered WL755, may be split into:—Front longeron clips starboard 1, front longeron clips port 2.

If desired, the division may be carried still further. The front longeron clip number WL7552, may be sub-divided into units:—Centre section strut socket 1, longeron plates 2. These are single pieces and cannot be further sub-divided.

The longeron plate will be numbered WL75522.

This is not a very large number, but in the most complicated pieces no greater number of figures should be required. A moment's thought will make it clear that the long numbers are used less frequently than the others since they only apply to the units. The job card for welding up the front longeron clip would be numbered WL755. But the man who assembles the gun bearers had a card numbered WL75.

Once the main sub-divisions are made they should remain as far as possible standard for all types of machines.

The advantages of the system will be apparent. A lot of similar small parts are found in the factory in an unfinished state. The number on the label attached to them, or the job card with them, is WL726. We know from "W" that they belong to the Waterman type of aeroplane. From "L," that they are on a particular order for these machines. The 7 shows that they are part of the military equipment. This information will probably be so near a guide to one who is used to the work, that he will at once recognize the part, but if not, the 2 will show that it is a part of the magazine case.

Of course, the same system could be used in connection with traction engines, agricultural implements, or any other machine or article of manufacture.

It is impossible to deal with all problems peculiar to each factory which may occur in the working of this scheme and for which special arrangements must be made. However, there is one point requiring a little explanation. A foreman very often will desire to put more than one man on a job. To meet this emergency, each foreman should be provided with a number of blank forms clearly marked, preferably by the use of a different colored card to that used for the original order. The foreman will be responsible for the form being properly filled up. These extra cards will travel through the works and eventually back to the planning department in exactly the same way as do the original forms which they supplement.

In some concerns it may be desirable to keep track of the work almost hourly, for example, when the work is carried on by more than one shift. To meet this requirement, the progress cards should, as above mentioned, be substituted by the small size cards recording single units.

Such card, say, 3 in. by 2 in. in size, is provided with at least two pilot index clips or flags. They should bear numbers to indicate the department to which they refer. At one side of the top edges of the cards is placed the proper flag indicating the department in which the work is in progress. The other flag on the opposite end of the top edge should bear the number of the department to which it next has to go. Further flags, colored red, may be used to mark jobs which have to be "rushed." Flags colored black may be used to show jobs temporarily held up for some reason or other. These special flags may be placed towards the centre of the top edges of the cards.

A box of cards indicating all the jobs at the moment in the factory will contain perhaps as many as 1,000, 10,000, or 100,000 cards, but will show at once the position of each department so far as work in hand is concerned.

This system, in a large shop, having a central stores, view-room or inspection department, acting as a pool between each operation, may easily be worked by the clerk checking jobs in and out of said pool.

Of course, the cards should be kept in proper order so that the position of any job may be ascertained at any moment.

A final davantage in this system will be found if two files or boxes for the cards are used. At the beginning of a week, or month, or any other period, an empty file is used. The first card to be moved, say, on Monday morning on a weekly system, is taken from the old file and placed in the new one. Any new cards coming in are, of course, placed and filed in proper order and with the proper flags in the new file. At the end of the week the old file should be very thin, whilst the new file should be corresponding full. Before starting the new period, the next week, the cards which have remained stationary in the old file should be removed and handed to the superintendent or manager, who would thereby have a positive and automatic means of seeing what jobs have remained stationary for the week. He can order any card to be replaced in the current file or otherwise dispose of same, as he thinks fit.

As a final warning, no system will be good unless the head man backs it and obeys it laws; every man, boy, woman and girl in the factory and offices should have their duties defined; each should understand as far as may be necessary the system of organization so that each one may assist to make the system so simple and complete that it automatically "runs itself."

Discussion

Mr. G. Holt Thomas (The Chairman) said the lecture by Mr. W. E. John on "Shop Organization" was a little departure from the usual practice of the Society, but a very necessary one at the present time. We had good designs in England, but it was no use having good designs without good production, or *vice versa*. The lecture was particularly opportune at present as he (Mr. Thomas) thought it would be impossible to organize any aircraft factory in England under the conditions which existed before the advent of the Air Board and the Air Ministry. It was impossible to organize without material, or if sufficient orders were not received, or if the authorities did not know what they wanted. But under the Air Ministry we had now departments for material inspection, and things had much improved. Another thing that stopped work was that the output of aeroplanes was formerly largely controlled by the number of times the Germans bombed London, the result being that works had to be doubled just when organization was contemplated. He thought that had now probably come to a standstill and that the present was a most opportune time for the discussion. He was always striving at organization, which, as Sir Henry Fowler would tell them, they had never got. The paper by Mr. John, he thought, would help them to obtain it.

Sir Henry Fowler (Assistant Controller of Aircraft Production) said he was compelled to take part in the discussion by the remarks the chairman had made. They must all appreciate that there had been no more difficult matter placed before the engineering world than the construction of a machine like the aeroplane, which was developing almost from hour to hour. In time af war it was absolutely necessary to give the fellows who were fighting and risking their lives for us the very best. From time to time something happened which pointed out that some slight alternation would give advantages, and that was one of the most damning things that could happen from a constructional standpoint. Mr. John had not put down for absolute comparison what would happen to his second set of figures if there were more than nine parts in any of those sections into which he had split it up. He would have found himself running in competition with the long figure he had given as an example of a shop number used in another system. Mr. John had shown them an excellent example of the kind of man it was necessary to put into the shop with his proposed organization. The manager must be whole-heartedly on the job. A fellow who had had to deal with a more simple proposition said this organization was needless, and he got through his work, but not in the time he ought to do. There was not only the difficulty with the managers and the foremen, but also with the men themselves, who thought if they left out a number or put in an extra number or a wrong number they would be paid just the same, and it was a matter of difficulty and patience to teach them to use the system. Anyone who had had to deal with aeronautical work had realized the importance of such a system.

Major Heckstall Smith said the system proposed departed from the majority of the existing organizations, but the departure was a good one. It established the great importance of a planning department and of dividing the work up into small sections. It was a great thing to divide aeroplane works up in that way, and it was not done universally. The author put the costing department under the planning department. Would he say why he had done that? He (the speaker) had hoped that he would have gone further into the real valuable functions of that department, as it was the brains of the works. Highly skilled people must be employed in that department, otherwise they would do more harm than good, and its personnel was the most important of the whole works. He took it the author meant the planning department would not act in the old fashion that used to exist when the foreman gave instructions to the workman as to how work was to be done—it still held in many works in England—but that the planning department took away from the foreman the clerical and instructional work he used to do and only left to him the selection of the men and the watching of the work of the men. Would the lecturer give a few words on the primary functions of the planning department and the class of men he would employ?

With regard to checking the work in progress and the material he did not agree with using quite such small cards for watching material which came in in driblets, or for the progress of the work. They wanted something large to hang on the wall and which would hit you in the eye, and a color scheme might show whether you were up-to-date, the work behind being indicated by red and the up-to-date work by black. Supposing the planning department had put the work through and the progress department was told to watch for a certain number of items every day or week, and when the progress sheet was passed one would see whether the articles were or were not coming in and would indicate by red or black whether the foremen were up-to-date with their promises or not. Otherwise he approved of the scheme, which was an excellent one.

Captain Hiscocks, R.F.C., thought the paper should show the conditions applying to the works into which the author was putting this organization; also the size of the works—500, 5,000, 50,000 hands—was a consideration. Did the author make the whole of the aeroplane in his own works, or how much did he buy outside? For a works of 500 men the system was a suitable one, but with 5,000 men the paper record would be so large that the whole thing might fall to pieces, and he would have to change over from a paper progress system to a minimum and maximum stock system, which would be more accurate. The dividing up of aeroplanes into main parts and groups seemed to him to fall to pieces in some respects. There might be half a dozen orders in the shop for manufacturing the same parts, and probably the foreman would overlook them and put them through in half a dozen batches instead of one batch. There were many parts which it did not pay to put through in batches of 50; they would have to be put through in batches of 500 for economical production.

The progress charts did not take into account that a large number of parts might have been withdrawn for spares, emergency orders, etc., and that threw out of balance the progress sheets, and the progress sheets could not show exactly where all the different parts were going. They might show what was coming in, but they might be withdrawn from the stores and certain parts might be found short when one came to the finished aeroplane.

Mr. E. C. Gordon England said there was a great tendency to view organization from the point of view of organization, and not from the point of view of the work about to be tackled. A system could apply to a small or a large works equally, provided the main thing was kept in mind—viz., the job to be produced. The organization should center round that, and not round the works of the men employed. Every branch of engineering required a special organization, a different one being required for aeroplanes from ships. A point which upset him was the question as to how one dealt in Mr. John's system with any one part, as it appeared in these days of standardization that that part would have several different numbers in the one machine. One of the main things to do was to cut down the different references to one item to an irreducible minimum, otherwise, a field was opened up for enormous error, because the foreman would be greatly upset

THE LONDON EXHIBITION OF ENEMY AIRCRAFT

By G. DOUGLAS WARDROP

IN arranging the exhibition of enemy aircraft at Islington, London, the Technical Department of the Aircraft Production Department of the Air Ministry have done the British aeronautic industry and the Allied air service a distinct service by making available for inspection the latest enemy developments. Through special permission of the Air Ministry AERIAL AGE was permitted to visit the exhibition and to make complete notes concerning the machines, engines and accessories for the benefit of the American aircraft industry.

The arrangement of the various exhibits is excellent. To facilitate examination the machines are stripped from one side of the center line of the fuselage, and left covered, as in flying condition, on the other, this enabling one to gain an impression of the general appearance of the machine, and also the internal details of the planes and fuselage. In most cases the machines are shown minus engines, this being rendered necessary by the fact that, owing to the methods of construction generally adopted for the fuselage, the stripping of this item detrimentally affects the strength of the structure.

The engines are shown in a separate section, and include an example of almost all the types of motors employed by the enemy. In this section there are two motors of each type, one completely set up, and the other dismantled and sectionalized for the closest inspection. This is of immense value to the student of the principle and practice of aero-engine construction. The most striking lesson here is that, no matter what one's views may be concerning enemy aircraft practice, it is very evident the motors, as exemplified by Mercedes, Benz and Argus, have been developed to a stage of great reliability. Engines of a very recent date of construction are shown, and the falling off in finish which might be expected of the manufacturers in a country which would logically be expected to be under considerable duress, is undistinguishable. The workmanship is excellent, and the metals, with but one or two exceptions, are of a high grade.

The total weight per horse power and the performance generally of German aero engines are not of extraordinary merit. As a matter of fact they are a fairly light weight per horse power, higher considerably than has been accepted in Allied engineering channels as desirable.

Reliability has been the sole goal of the constructors, and the records would indicate that they have succeeded in no small measure. In the exhibition are shown the 120-, 160- and 260-h.p. Mercedes; the 160- and 120-h.p. Benz; the 120- and 220-h.p. Benz; the 120- and 200-h.p. Argus, the 110-h.p. Oberusel and the Maybach airship engine, concerning all of which we shall have something to say in subsequent issues.

With the exception of the Oberursel (which is a German modification of the Gnome), all the types of engines were in use before the outbreak of the war, but it is worthy of note that whereas now the dominating motor is the Mercedes, before the war the majority of the German aeroplanes were engined with Argus and Benz motors.

The various aeroplanes shown demonstrate very clearly the chief characteristics of the German aircraft.. The types shown include the Aviatik, L. V. G., Albatross, Ago, Hannover two-seater, Halberstadt, Pfalz, Albatross D1, Albatross D3, Austrian Berg, Fokker triplane and Friedrichshafen bomber. The latter is twin-engined and fully rigged, 78 feet span, with 260 Mercedes motors.

This bomber is one of the most interesting types in the exhibition, and affords some new examples of constructional details. In addition to the complete machine there are also parts of similar machines, showing to greater advantage the various span and strut sections, details of wings, controls, tanks and metal fittings generally. All of these we shall deal with in detail.

There is a representative collection of instruments, machine guns, bomb dropping devices, and aviators' clothing equipment.

In a cursory mention of building practice there are a few things that stand out noticeably. For instance, there is an extensive use of plywood, the laminæ varying from three to fourteen, and in thickness from 1/32d of an inch to 1 inch. It is used for built-up box wing spars, ribs, leading edges (very considerably), brackets, supporting engine bearers, and almost without exception for the body covering. There is a pronounced tendency towards the use of steel tube for all control surfaces, and also for the under-carriage. In many cases oil and gasoline tanks are made of brass. The fabric used seems to vary in quality very decidedly, and some of the machines are indeed very poor. The use of helical coil springs as shock absorbing media might suggest a scarcity of rubber.

A noticeable detail of enemy design is the method of washing out the wing tips, until, in most cases, this portion of the wing forms a negative angle to the horizontal. Perhaps it is due to the early influence of the Etrich or Taube monoplanes. While the modification of Etrich tip has still been retained, the sweptback type of plane has been entirely superceded by the plane of rectangular plan form.

In some of the types the great care taken in forming a good entry to the fuselage, by the attachment of a revolving spinner to the propeller, is nullified by the exposed radiators, water pipes and exhaust manifolds.

In one or two of the more recent German machines, however, the radiators are of the flat-tube type, and are mounted in the center section of the top plane, conforming in shape to the wing section.

The workmanship in the various machines is of a very varied nature. But in none of the machines shown does it call for ultra-favorable comment, while in one or two it most decidedly would not pass muster here.

But the notes which will follow this article will be of considerable interest to American aeronautic engineers.

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by the fact that one part was known in the works by three or four different numbers. If it were reduced to one everybody would always recognize it. There would be less errors on the clerical side, and less mental effort would be applied to remembering and identifying that part. There were great risks if a part had several different numbers or references of putting those parts through separately instead of in one bunch. He suggested that the best method of dealing with those parts was to let the planning department put them through as parts of a whole order, and not with reference to any one section. That would obviate setting up a machine to produce a few of them and then breaking down the machine and setting it up for some totally different article. The first duty of the planning department was to see how much labor they had under any one head in the works. For example, how many skilled men or unskilled women they had on any one operation. They could then state definitely what their output of any one article could be, and it enabled them to balance the whole works in such a way that no one section would be producing more of one article than was required to balance the production of the various other items in an aeroplane. He found that practice was possible and that it paid.

Mr. R. Borlase Mathews said he would like a little more information as to how the lecturer used and applied his cotsing. In many works the costing figures were not available as quickly as they might be to serve their turn in reducing the cost of production of further batches.

He had been interested in mechanical methods of calculation, and one of the best examples he had seen was at the R.A.F. works, which Sir Henry Fowler lately controlled. They had a system of machine whereby detailed costs could be analyzed rapidly. Such machines were known as the Burroughes machine, which was used for the wages portion, but for the works analysis and costs of operation the Powers counting machine carried the thing out in careful detail. He would have liked greater detail as regarded the planning of the work along the line of putting what might be called more brainwork into the arrangements for facilitating the work of the foreman and the men. That was an application of what was known as Taylorism in workshop management. As regards the woodworking portion of aeroplanes, there was great scope for the use of jigs in the manufacture rather from the view of the management—that is pre-planning—rather than letting the planning slide to a later time when the work actually got into the shops. The lecturer had remarked that he went ahead with the work if the order received were satisfactory. That reminded him that some American firms if they found the price was not satisfactory re-designed the job, but possibly the Air Board would stop that sort of thing here. He had used the decimal system of classification in engineering for fifteen years, and found it very useful. He had even introduced it into the Air Board, which was rather apt to act on conservative, War Office lines. He divided the aeroplanes into nine parts and one general miscellaneous part, and took them alphabetically. The parts were armament, ballast, engineering fittings, fuselage, instruments and fittings, landing gear and anchorage, main planes, tail, tanks and pipes. This system of numbers was not appreciated quite as it might be in this country, and it was most useful that a number instead of being a mere number should tell something definite about the thing being dealt with. In America and on the Continent they had this system in use more generally than we had in England. The question had been asked how one managed if the article were only divided into nine parts? But when one knew the system it was not difficult. There was a standard size bolt used on the main planes, fuselage, or anywhere else. It went on a quantity basis, and it was a thing with regard to which the planning department would have started out on that basis. Works that produced bolts of a certain size on a batch basis would not show evidence of much brains in the planning department.

Mr. W. E. John said with regard to the remark about dividing into nine sections, anything could be divided into less or up to nine different sections. He did not use ten because the "O" was a figure the workman did not like. The workman, if he had no experience of decimals, dropped the "O" if it began a number. With care, anything could be divided into nine. He was asked by a lady in one of the factories, who had charge of the filing of the correspondence, to adapt this for her filing, and he found one could divide her filing into nine main sections, and from that it was again divided into ten, and the sub-division increased as far as necessary. Sir Henry Fowler referred to the fact that the above system would be up against having the wrong numbers put on the job by the men. In the system he had sketched every order was written, in the first place anyway, by the planning department, and if there were any copies it was due to two men being put on one man's job, to meet an emergency. It was a plain copy made by the foreman, and if the number was dropped or there was anything wrong with the copy it was not hard to trace it when it came through the shops, because they had the original which was made out by the planning department.

Another speaker asked why the costing section was put under the planning department—why the planning department was divided into cost and progress. It was really the obvious thing to do. The cost had to be cut to fit the cloth, and the planning department should have some say in the way the progress of the job through the shops was planned. The type of man he would put in charge of the department would be a man who had served an apprenticeship and had very wide experience of the actual production in the workshop. It was very difficult to get the right man, as apprentices were not often good office men. The man must have passed through the real details of a factory and know something of accountancy or costing.

Major Heckstall Smith said he wanted his records posted large, but this meant papering the walls of a very large room. The number of jobs in an ordinary factory would want a lot of room to be readily visible at the same moment. A scheme of this kind used to be in operation at a place where he worked at the time in the West of England. They had a system of flaps, such as were used for advertising postcards, and these were used to show the different positions of jobs. With regard to small parts of aeroplanes being numbered twice over, wood screws, for instance, were used in all parts. Few aeroplane factories would produce these screws. That would be a stock job. If the numbering scheme were to be applied to small parts bought inside or small clips, or anything used in quantities, they would give it "Sk," which meant "stock," and number it accordingly. It was true that spares came in and that there were emergency orders, but i fan emergency order came in for fifty sets of wings it should not interfere with the original contract, which went on just the same. The emergency order was put through separatel,y and the right clip put on it, and it was sent as a separate order through the whole organization. Coming back to the stock, the screws might be different sorts, and after "Sk" one could add the figures 1 for round head, 2 for counter work, 3 for metal thread or anything else. If it were a wood screw it might be No. 8 or start in any size which was suitable to the factory, so that the "1" might be divided into 1, 2, 3, 4, 5, and so on, for different carieties. Or one might use 1 for iron and 2 for brass, and then divide those numbers into 1, 2, 3, and so on. They knew No. 1 was a round head, and if it was 11 it was iron right through. This could also be done with turnbuckles or anything else used in quantity.

The big gymnasium at Dunwoody has been turned over entirely to the aviation classes. Here the students assemble and dismount, rig and repair

MAKING NAVY AVIATORS IN A HURRY

By WILLARD CONNELY, U.S.N.R.F.

AMERICA had been in the war about two months when Ensign Colby Dodge, U.S.N., conceived the idea of introducing naval aviation fifteen hundred miles inland. At that time he had been ordered to duty in Minneapolis, where he was instrumental in starting the Dunwoody Naval Training Schools, now sending to the fleets four thousand expert craftsmen annually. To local civilians he proposed an aero club, to back a unit of pilots. The club was organized with a rush, but like all our war preparations it took some months to gain momentum. The first class of student officers went in April to Boston Tech for examination. All passed with "flying" colors, meaning among other things that they doffed their blue jackets for the forestry green uniform of the air corps. Then they were detailed for solo flight practice to Atlantic and Gulf air stations.

A second class of pilots, quickly authorized by the Navy Department, complete ground training in September, after which it is contemplated to enroll twenty-five men every fortnight, keeping one hundred students under continuous progressive instruction, so that twenty-five graduate every two weeks as well. This scheme, providing for a highly concentrative two months' training in the preliminaries, is believed to be about the peak of velocity in developing navy birdmen.

To those familiar with the ground work for the Naval Reserve Flying Corps an analysis of the separate studies would unfold nothing new. There is the usual prescribed schooling in the four major subjects—navigation, rigging, motors, gunnery. The planes, which are torn down and reassembled by the students as fast a a youngster builds castles with his stone blocks, are a Burgess-Dunne, a Sturtevant, and the two Curtiss types, J-N-4 and J-N-3. The engines are a Curtiss O. X. ninety, a Sturtevant 145, a Gnome hundred, and a Hall-Scott hundred. An adequate supply of Lewis and Colt machine guns takes care of the gunnery classes, and Colt automatics and Springfield rifles supplement with target practice. With the best features of the original Dunwoody electrical and radio courses as a foundation the work in signalling, complete with blinker, semaphore and wigwag equipment supplied by the Government, is unusually thorough.

Seamanship as given student officers at Dunwoody, however, presents some novel points. A lake about a mile and a half square is the medium of imparting fundamentals concerning boats and water manoeuvres. This branch of the curriculum is in charge of chief petty officers—boatswain's mates and gunner's mates—who were old in the service when our little controversy with Spain was in bloom. They know all species of boats, guns and water, and an inland lake gives ample opportunity to teach the rudiments.

War canoes, motorboats and ten-oared navy cutters are employed to train the pilots in handling small craft—gangway, dock landings, coming alongside, hoisting, lowering, sea anchors and parts, lead line, knots and splices. Each cutter mounts a Lewis gun, and is fitted with fore and main sails. Daily after indoor training hours at school the fledglings march to the lake, to row, sail, race motorboats, or swim. A swimming instructor is on duty at the lake, and it is his job

In the carpenter shop the men learn to make each part of the woodwork necessary for aircraft, how to dope the fabric, and how to build pontoons

On Saturday morning the student officers don their dress uniforms and make ready for inspection by the Commandant at their barracks. Meantime, in a corner of their armory, they have an opportunity for some extra study of the workings of the Lewis gun

to see that every student proves himself at home in the water.

But the seamanship instruction does not end here. Every night after mess, at barracks in the aero club, the chief petty officers who drill the tyro pilots at the lake give lectures and blackboard talks on such subjects as lighthouses, buoys and beacons for American and European coasts, code flags, storm signals, lights on ships and seaplanes at anchor, tide tables, recognition of ships of various nations, with models and silhouettes.

Naval indoctrination is also taught at this hour, so that the men learn something of ship organization, honors, and the value of initiative.

A course in photography embodies map making from photographs taken in flight, with rectification and the scale equalizer considered. The men are taught how to prepare aero cameras for flight, also the formula for calculating the area obtained in pictures. Every student must know, too, the photographic processes for developing and printing.

In a short course on aerial observation, map reading, communication codes (to artillery), the zone call system, pre-arranged shots, and the use of the aeroplane aerial are studied. Enough astronomy is given so that the flying aspirants understand the apparent movement of the heavens, polaris, and the distinction, for example, between the Pleiades and Cassiopeia.

The daily routine for these student officers, once started at quarter of six in the morning, never lets up until ten at night. Not a moment in the interim is unocupied. The aero club, where the men both mess and lodge, seems like a merry enough clubhouse, or fraternity house, if you happen to step in about three minutes before the nonday meal. Then you may hear a couple of banjos, a raggy piano, and something more or less vocal. At any other hour the place is as quiet as an actors' club at breakfast time: The future aces are either at Dunwoody, at the lake, or studying in small groups within their rooms, or in the basement armory taking down a lecture. No liberty is granted except on Saturday afternoon and Sunday, and a man delinquent in any of his work is restricted even then.

Whenever Commander Warren J. Terhune, U.S.N., commandant of all U. S. Naval Training Schols in Mineapolis, issues a call for new aviation recruits it is surprising how many of the applicants are found to be under the minimum age of 20 years. They come in dozens, aged nineteen, or nineteen and a half, some of them younger than that.

"What's the difference?" they protest. "We'll be twenty by the time we get through training, won't we?"

It is difficult to refuse these spirited youths, for they are usually splendid physically, and they have the education. It is futile to ask them to "come back in six months." They join some other branch. Still, it is hoped that some of them will reappear for the autumn class.

(*Continued from page* 1312)

With the American Army in France

The Americans in the fighting line north of Soissons had a quiet day on September 3.

There was considerable aerial activity in the Vesle region and several combats in the air. One German machine is reported to have been downed by Allied airmen.

American airmen successfully bombed Longuyon twice on September 3.

About thirty aeroplanes flew over the German lines and dropped a few bombs.

Pershing Praises American Flyers

With the American Army in France.—General Pershing has sent a letter to the Chief of the Air Service, commending the First Pursuit Group. The letter says:

The Commander in Chief has learned with great satisfaction of the work of the First Pursuit Group of the Air Service and desires to commend it especially for its praiseworthy record.

The handicaps under which this unit of the American expeditionary forces has been organized and begun the discharge of its duty are well known and recognized. With fine spirit and determination it has overcome obstacles and already achieved an enviable record. Its commander and personnel are congratulated for their effective and daring work.

9 American Aces Are Now in France

Paris.—American aviators are playing a large role in Allied aerial actions. Fighting German aviators, bombing troops, depots and aerodromes during the day and bombing the centres of enemy activity behind his lines at night, all form part of the work undertaken by the young American pilots. Their air victories are numerous and they are showing themselves to be excellent pupils of the French flying aces.

Among the American aces is Lieutenant Tobin, who, since July 11, has gone from success to success. On that day Tobin, who had been at the front only a few days, spotted an enemy machine making for the American lines. He immediately attacked and shot his adversary down in flames.

Five days later he brought down his second victim in the same circumstances. On August 1 he added another German flier to his bag and yet another on August 10. A day later he accounted for his fifth German. So Tobin became an ace.

To date the American aviation aces are Lieutenant Putnam, with twelve victories officially counted; Captain David Peterson, with six; Major Thaw, Sergeant Major Parsons, Lieutenant Douglas Campbell, Lieutenant Meissner, Lieutenant Rickenbacher, Lieutenant Tobin, five each. Lieutenant Porter has shot down four.

All these fliers operate scouting or fighting machines, while there are many others, of whom very little is heard, who fly heavy bombing machines which are in the air just as often, if not oftener, than the scouting machines.

Italian Army Headquarters.—One of the first exploits of the American hydroaeroplane pilots trained in Italy was that of J. H. Hammond of Baltimore, who saved Lieutenant Ludlow during a raid on the Austrian naval base at Pola. While Ludlow was dropping bombs his machine was riddled by the Austrian fire, and he was compelled to alight on the Adriatic three miles from Pola. When Hammond saw his plight he swooped to Ludlow's rescue, braving the concentrated Austrian fire and the attacks of five enemy aeroplanes.

Hammond hit the water near Ludlow's machine, ran alongside, took Ludlow aboard and stowed him under the motor of his one-seater plane. He then set Ludlow's machine afire.

Meanwhile the enemy aviators were keeping up a steady fire. Hammond with his own gun kept the Austrians off and got away safely, although pursued halfway across the Adriatic. Finally his machine gave out while near the Italian coast and the two Americans were forced to swim ashore.

Recruiting Stopped

The following statement is authorized by the War Department:

General March, Chief of Staff, has directed the discontinuance of voluntary enlistments for the Army, except as authorized by act of Congress in certain cases.

General Harris, the acting Adjutant-General, has issued instructions by telegraph to all recruiting officers in charge of recruiting districts to close up the recruiting stations as soon as practicable, in accordance with detailed instructions previously sent by mail. The enlisted men at the recruiting stations are to be sent to the nearest recruit depot, where they are to be physically examined and their qualification records made out, with a view to their assignment to appropriate duty. The six recruit depots, namely, Fort Slocum, New York; Columbus Barracks, Ohio; Fort Thomas, Kentucky; Jefferson Barracks, Missouri; Fort Logan, Colorado, and Fort McDowell, California, are to be utilized during the continuance of the war as mobilization places for selective service men, whence these men will be distributed to organizations.

The only original voluntary enlistments hereafter authorized will be of men over forty-six years of age and under fifty-six years. The enlistment of these men is authorized only for Staff Corps and Departments. There are few applications for enlistment from among this class of men and the enlistment of such as are found qualified can be effected at the mobilization depots enumerated above, or any one of the military posts or encampments throughout the country.

(*Continued on page* 1338)

SOME METEOROLOGICAL CONDITIONS WHICH INCREASE THE DANGER OF FLYING*

By Captain C. J. P. CAVE, R.E.

Introduction

IT may seem rather presumptuous for one who does not himself fly to discuss the dangers that may be met with in the air as though a landsman who had crossed the Channel a few times were to write on the navigation of a ship across the ocean. At the same time, it may be of some use to point out certain conditions of the atmosphere which seem to me to constitute dangers, although I may be mistaken in my estimate of some of these, and would welcome any information from pilots bearing on the subject. In fact, my paper is meant to elicit information rather than to give it.

At the same time I should like to protest very strongly against the idea that we have made so much progress in the science and art of aviation that we can afford to disregard the weather altogether, except perhaps in the case of fog. The idea is a common one, and has been often stated, but it seems to me that it is a most dangerous idea to foster. An airman cannot afford to disregard the weather any more than can a seaman. A seaman puts to sea in almost any weather, but the fact that storms take their toll of shipping is a proof that seamen cannot entirely disregard these things. Neither are airmen immune. Only last summer it was stated in our official *communique* that five of our aeroplanes had failed to return owing to a severe rainstorm.

Probably what is meant when it is stated that airmen can afford to disregard the weather is that somuch progress has been made in the construction and design of aeroplanes that they can go up in almost any wind and can fly safely in winds that would have proved fatal to machines in a few years. But there remain some conditions that are dangerous, and many that are severe hindrances to aeroplane work in war.

The chief conditions that suggest themselves to my mind as increasing the risks of flying are the following:—(1) Gales; (2) squalls; (3) bumps and eddies; (4) clouds; (5) rain, hail and snow; (6) fog; (7) lightning. It is possible that the number might be added to by experienced pilots, and it is also possible that some of the conditions that seem to me to be dangers may not really be such, but I suggest them in the hope of getting more information.

Gales

In the early days of flying strong winds were more formidable than to-day, but there are still occasions when the wind is so strong that machines are able to make little or no headway against it, and such a strong gale may arise with great suddeness and sometimes without much warning.

An example occurred on December 28, 1914, when a small depression formed over the Bristol Channel and passed across the south of England, causing a gale that did a considerable amount of damage. In the south-east of England it was nearly calm before the onset of the gale, which sprang up with great suddenness. At Farnborough, for instance, an anemomter exposed 140 feet above the ground level registered a velocity of 80 miles per hour, when only a quarter of an hour previously it had been quite calm. I do not know that there were any aeroplanes flying when the gale began; probably not. The gale began in the afternoon in the southwest of England, but it did not reach the southeastern counties nor the northeast of France till after dark. But a gale of 80 miles per hour 140 feet above the ground must have been considerably more at a height of 1,500 feet, and I venture to think that if aeroplanes were flying when such a wind sprang up many would have failed to return to their aerodromes. If at the same time there were a development of low clouds when such a gale came on aeroplanes would be likely to lose their bearings entirely.

Besides the loss of aeroplanes actually flying, a gale such as the one under discussion would cause severe damage to hangars and tents, and I believe that on this occasion considerable damage was caused in this way.

Gales may spring up with great suddenness at all times of the year; in fact, I think that a summer gale may often give less warning of its approach than a winter one. Anyone who has done any sailing round our coasts must remember cases where they have been caught in gales a couple of hours or so after having been lying becalmed. I think that easterly gales in the summer are apt to spring up suddenly in this way.

A gale, however, usually gives warning of its approach, and may often be forecasted many hours in advance, and the weather map for the day will usually indicate when a gale is likely.

Squalls

A squall is a temporary rise in wind above the mean velocity that preceds and follows it, the rise in velocity being continued over some minutes at least, and is thus distinguished from a gust, which only lasts a small part of a minute. Squalls are of innumerable degrees of severity. On a day of blustery northwest winds, when there are large cumulus clouds about, one may have a succession of squalls, whose approach can be seen at sea some time before the onset. Such squalls are probably not of any particular danger to aeroplanes, as at sea they are not of much danger to shipping, except in the case of small open sailing boats, but in peace time at seaside resorts they take their toll of holiday makers who are sailing with the main sheet made fast.

More intense squalls are associated with thunderstorms, and they are all the more dangerous since they are often preceded by very light winds or even by a complete calm, and within a minute or so from their onset the wind is blowing at the rate of even 60 to 80 miles per hour. A typical example of such a squall occurred on August 2, 1906. As seen in the east of Hampshire, this storm came up from the direction of the Isle of Wight in the shape of a huge cumulus cloud with a great extension of false cirrus at the top, giving it the appearance of a giant mushroom; the day had been very hot and the air was very still As the storm approached it was seen that heavy rain was falling, but there was no sign of wind to the untrained eye. A few minutes before the rain reached the observer a continuous roar was heard, and as the first drops fell a furious blast of wind arose; the wind only lasted a few minutes, and in three-quarters of an hour the storm has passed and the weather was fine again. The storm passed over the South Downs, and the same storm or another moving parallel to it reached Guildford, where the damage done by the wind was very great. An airship would have been in the very greatest danger and could hardly have weathered the storm.

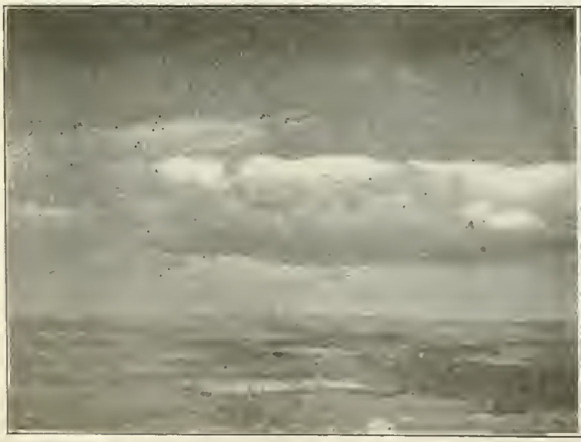

Fig. 1. Part of a squall cloud. The cloud stretched right and left as far as could be seen. When it came overhead there was a moderate squall with snow

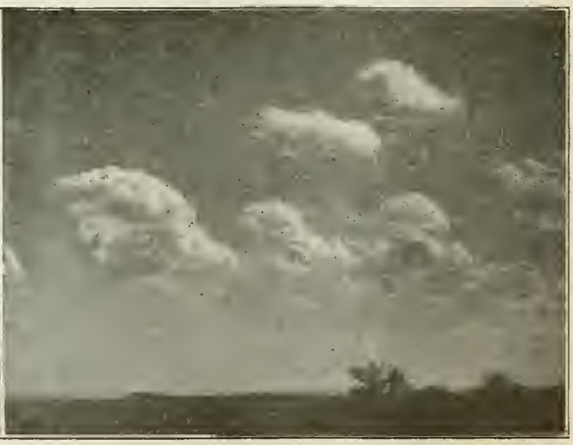

Fig. 2. Very small cumulus clouds beginning to form

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*Paper read before the Aeronautical Society of Great Britain.

The squall in front of an ordinary thunderstorm is probably a modification of another variety known as the line squall. The sequence of events in a line squall is somewhat as follows: A bank of clouds is seen extending along the horizon, the upper parts being white and in shape like ordinary cumulus, though the whole cloud usually appears of a more uniform height, and not broken up into such distinct peaks as is ordinary cumulus. (Fig. 1.) As the cloud approaches it is seen to be extremely dark below, and it usually extends in a long line, stretching from horizon to horizon, but owing to the effect of perspective it appears like an arch in the sky, the summit of the arch coming nearer and nearer overhead. As the cloud reaches the observer a violent squall springs up, the wind veers rapidly or even suddenly, rain falls in torrents and is often accompanied by hail, and there may be thunder and lighting; at the same time the temperature falls considerably, a fall of five or ten degrees being common, and it is sometimes as much as 20 degrees. When the cloud is approaching and is nearly overhead a curious sinuous line is seen at its base extending right along the front of the cloud, and it is this line which gives the name of line squall to the disturbance. After the first blast the wind blows strongly for a time and the heavy rain lasts for half an hour, more or less; this is followed by a less intense fall of rain and by decreasing wind, and after an hour or so the weather often clears up and becomes fine.

A line squall is only a few miles across, but it may be several hundred miles long, and it advances across the country broadside on at the rate of 20 to 40 miles per hour; one such squall has been traced from Cape Wrath to the centre of France, another from the northwest of Ireland to the centre of Germany. The list of disasters caused by line squalls is a long one; the best known case is that of H.M.S. *Eurydice*, a training ship homeward bound, that was struck by such a squall when off the Isle of Wight on March 34, 1878, and foundered with heavy loss of life.

Besides the blast of wind in front of the squall, there are great up currents in front and down currents near the middle of the squall, with much eddy motion between them. Such conditions could hardly fail to be dangerous, and, though an aeroplane might possibly come safely through them, it is hardly likely that an airship would.

The onset of a line squall is generally sudden, though anyone with a very little training in meteorology can see it coming while it is still some way off. On January 20, 1916, a line squall passed across the country from northwest to southeast, reaching Farnborough at 10:30 A. M. The morning had been fine, and a number of machines were out on the Common; the squall came on suddenly, and several machines were damaged before they could be got back into their sheds. A storm such as this one can be predicted with some success if the machinery is ready for the purpose. The general conditions favorable for line squalls can usually be forecasted from the Daily Weather Map prepared at the Meteorological Office, but unless a line squall occurred at one of the Meteorological Office observing stations at the time of the taking of the meteorological observations or shortly before, the existence of the squall may not be noticed on the map. The squall of January 20, 1916, which was not particularly severe, was first observed in the south of Ireland at about 4:30 A. M. It was accompanied by much thunder and lightning. It crossed the Irish Sea and reached the coasts of Cornwall and Wales at about 7:30 A. M., and moved across the country in a line 100 miles long or so, the movement being, as usual, at right angles to its length. Now this storm did not affect any of the Meteorological Office observing stations. and hence its existence was not known officially, as one may express it But, since a squall of this type is perfectly easily recognized, its coming might have been foretold if the proper machinery had been in existence to deal with it; such a warning might have been received in plenty of time for the aeroplanes on the Common at Farnborough to have been put in their sheds in safety.

That there is time for such warnings to be given is shown by the fact that recently I had a telegram from Upavon telling me that a line squall had just passed over; the telegram was received about ten minutes before the squall, which was not at all a severe one, reached Farnborough. Ten minutes is doubtless too short a time for the warning to be acted upon, but a station further west than Upavon could have sent a warning that would have been received in plenty of time.

It appears to me that it would be quite feasible for an observer at every aerodrome to send a telegram to some central office when a line squall took place; at the central office the general weather conditions would be well known, and therefore the direction of motion of the squall could be foretold. In addition, other reports would come in as the squall reached other aerodromes, and the rate of travel could be obtained with some accuracy. Warning could then be sent to all aerodromes which were likely to be affected, and some signal might be hoisted in a conspicuous place where it could be seen not only by those who were responsible for machines on the ground, but also by pilots who were flying in the immediate neighborhood of the aerodrome. Some such organization would not be complicated, and would only occasionally have to be put into use, but it might be the means of saving machines, and possibly lives also. If the information were to be sent out by wireless the warnings would be received still earlier. But weather forecasts are looked on in some quarters as the subjects for jokes, and it will take some serious accident caused by line squalls before anything practical is likely to be done. A severe line squall is generally accompanied by lightning and thunder, and an automatic lightning recorder would indicate its approach, especially in winter, when thunderstorms are almost entirely of the line squall type. The lightning recorder at Farnborough began to record lightning at about 5 A. M., on January 20, 1916, and it was quite evident from the chart that something quite out of the ordinary, for the winter, was occurring.

Bumps and Eddies

I do not propose to deal with these at any length. The danger from bumps is small with modern aeroplanes, though in the early days of flying they were a great source of danger. Pilots are far better qualified to speak of bumps than is a meteorologist who has only been taken in the air a few times as a passenger. Bumps are mostly due to rising currents of air over surfaces of the ground that are at different temperatures and to eddy motion due to the wind blowing over irregularities of the surface. They also seem to occur at the cloud layer when there is a sheet of cloud, and they occur, of course, with cumulus clouds.

In this connection there is a point on which pilots could give some information. At Farnborough an easterly wind is far more bumpy than a westerly wind. Is this due to some local configuration of the ground, or is it something inherent in an easterly wind? I suspect that there is some connection between bumpiness and easterly winds, but what it is I cannot attempt to explain. An easterly wind has, seemingly, peculiarities of its own; it is said, for instance, that there is always more sea in the Channel with an easterly wind than with a wind of corresponding strength from other quarters.

Clouds

Clouds may be a danger in several ways. In the case of cumulo nimbus clouds the heavy rain, and possibly hail, or the snow in winter, may prove extremely dangerous. Such clouds, too, are often of great extent, and are the sea of very rapidly ascending currents of air. A pilot might have to fly a considerable distance before getting clear, and might easily lose his bearings. A cumulo nimbus cloud is one that should be avoided if it is possible to do so, and, as these clouds often occur in isolated masses, it may be at times possible to fly around them. A cumulo nimbus, the true shower cloud, from which rain, hail or snow is falling, may be distinguished from simple cumulus by the fact that the top of the former cloud, instead of being rounded and hard-edged, is brushed out into a soft-looking mass of fibrous cloud called false cirrus. It is true that showers fall from simple cumulus clouds, but the really heavy falls are from cumulo nimbus.

Cumulus clouds are more common in summer than in winter. They usually begin to form in the morning as the day gets warm, and reach their greatest development about two or three in the afternoon, after which they generally begin to disappear, and by sunset or soon after the sky may be quite clear even after a day of great development of this form of cloud. But they may be met with at other times, and they form after sunset in the summer when shallow depressions, bringing thunderstorms, are approaching.

Low sheets of clouds may prove a hindrance to work with aeroplanes, and if they are very low they may cause difficulties for a pilot in finding his way back to the aerodrome, or even difficulties in landing at all. The possibility of low sheets of cloud forming after a clear morning, especially in winter during unsettled weather, should always be borne in mind. A glance at the latest weather map will often be a valuable guide as to whether a fine morning is likely to last. Take, for instance, map for 7 A.M., on December 24 last. This shows that the sky was clear in northeastern France, but subsequent reports show that it became overcast and rainy, and that there was a great extension of low cloud. Anyone who had in the least followed the weather on the days preceding this date and who had seen the map for the day, or even for the preceding evening, would have realized that the fine morning was not likely to last beyond a very short time. I maintain that aeroplanes going up on such a morning would have been extremely likely to find low clouds extending to within a few hundred feet of the ground before their return, and they would therefore be in some danger. It might be that it would be necessary to incur the danger, that it was worth incurring the danger for the results that might be obtained, but it would be absurd to say that such meteorological conditions would not add to the risks of flying.

(To be concluded)

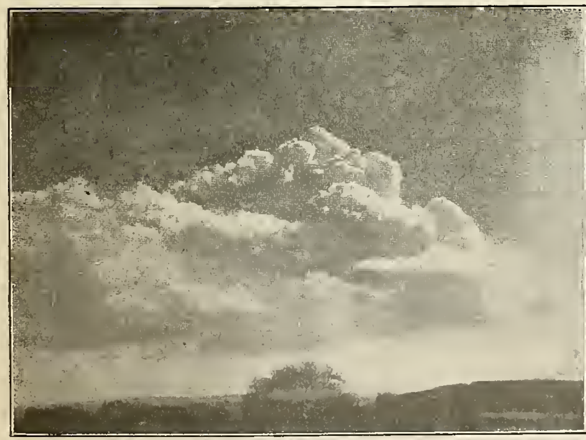


Fig. 3. Simple cumulus with hard edge rounded top

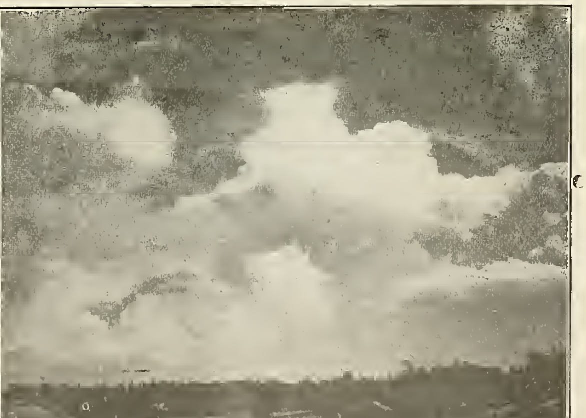
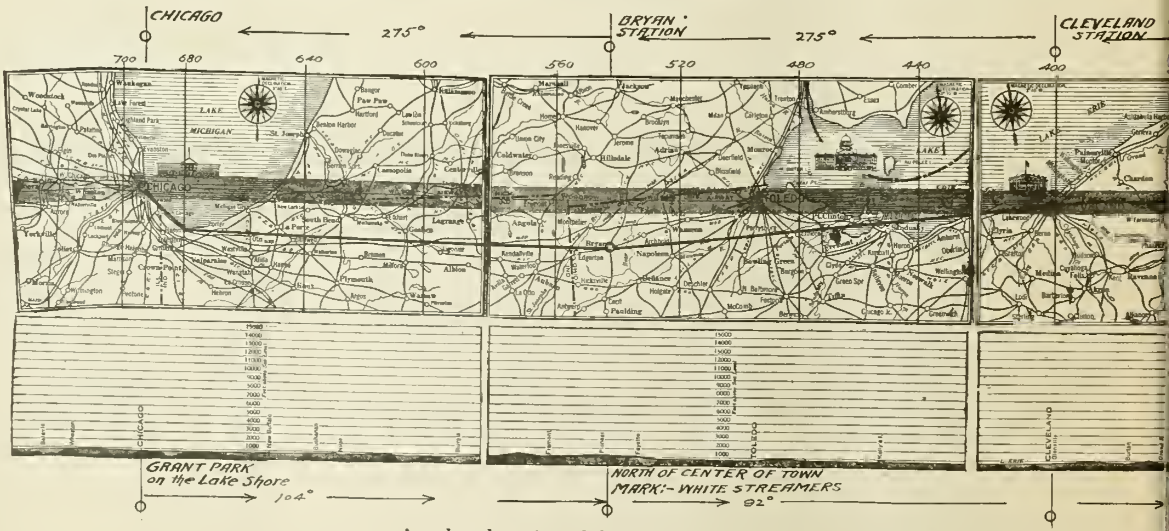
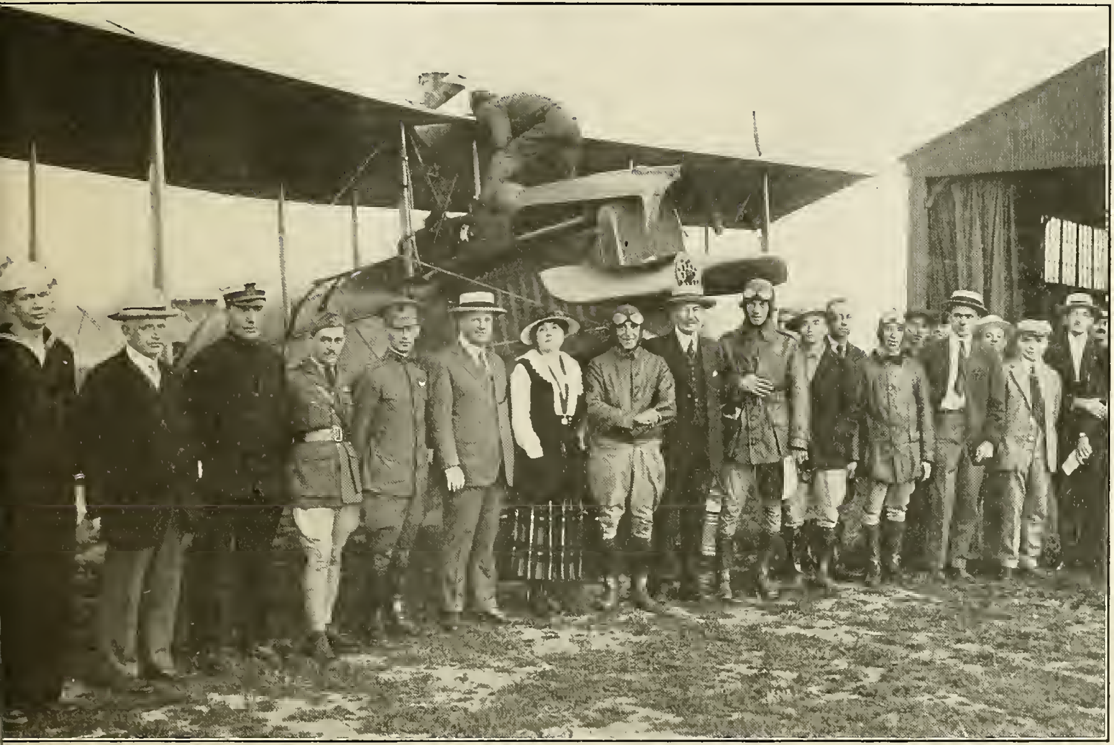


Fig. 4. Cumulus beginning to turn into cumulo nimbus: the top of the cloud in the centre is becoming soft edged fibrous

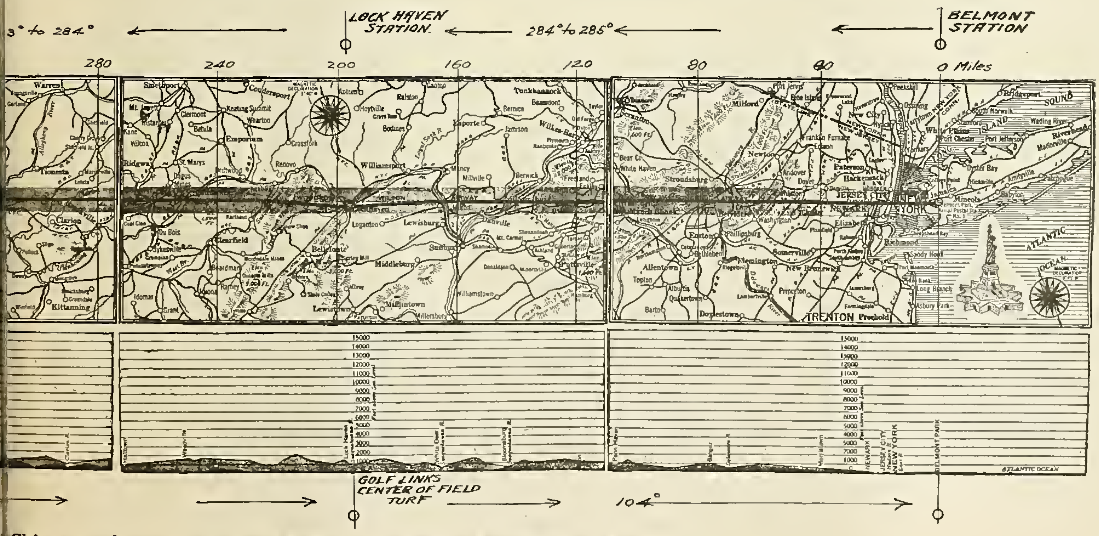
A remarkable photograph taken at Belmont Park at the start of the aerial mail, showing the threatening clouds and forecasting the adverse weather conditions which prevented the aviators completing the New York to Chicago flight within ten hours The machine is the Curtiss Liberty used by Pilot Gardner in making the Chicago-New York flight in one day



A reduced section of the Woodrow Wilson Airway Map used by the aviators in the

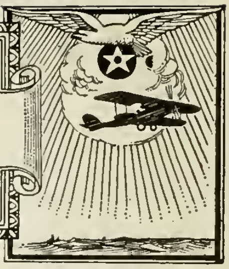


e start of the aerial mail at Belmont Park. From left to right: V. M. Norris, C.S.K.U.S.M.; E. M. Norris, superintendent l mail for New York City; Captain Robert A. Bartlett, famous arctic explorer; Lieut. Eytinge, Canadian Air Service; . Pennypacker, U. S. Air Service; Mr. Alan R. Hawley, president Aero Club of America; Mrs. May Brown-Dietrich, hter of ex-Governor Brown of Maryland; Ed. V. Gardner, aero mail pilot No. 2; Postmaster Patten of New York; Max r, aero mail pilot No. 1; Robert Shank, aero mail pilot; Maurice A. Newton, aero mail pilot; C. De Hart, aero mail pilot; eorge L. Connor, chief clerk to Mr. Praeger; Henry Woodhouse, editor and publisher of Flying and Aerial Age Weekly; Harry L. Hartung, Belmont Park representative of the postoffice



Chicago and return aerial mail flights. This map is described on page 1310

NAVAL and MILITARY AERONAUTICS



Key to Abbreviations

AAD—Assigned to active duty.
ADO—Report to Aviation Supply Depot, Dayton, Ohio.
ADT—Report to Aviation Supply Depot, Dallas, Texas.
AFO—Report to Aviation Supply Depot, Fairfield, O.
AGC—Report to Aviation Supply Depot, Garden City, L. I., N. Y.
AHT—Report to Aerial Gunnery School, Houston, Texas.
AIR—Transferred to the Air Service, National Army, without change in rank or date of commission.
ALF—Report to Camp Alfred Vail, Little Silver, N. J.
AMV—Report to Aviation General Supply Depot, Morrison, Va.
AOV—Report to School for Aerial Observers, Hampton, Va.
APR—Report to School of Aerial Photography, Rochester, N. Y.
ARV—Report to Aviation Supply Depot, Richmond, Va.
ASM—Report to Aviation Mechanics' Training School, St. Paul, Minn.
BFT—Report to Barron Field, Fort Worth, Texas.
BRN—Report to Bakers Field, Rochester, N. Y.
BST—Report to Brooks Field, San Antonio, Tex.
CAF—Report to Carlstrom Field, Arcadia, Fla.
CAP—Commissioned as Captain, Aviation Section, Signal Corps.
CDT—Report to Aviation Concentration Camp, Dallas, Texas.
CFT—Report to Carruthers Field, Fort Worth, Texas.
CGC—Report to Aviation Concentration Camp, Garden City, L. I., N. Y.
CGS—Report to Aviation Concentration Camp, Greenville, S. C.
CIT—Report to Radio School, Carnegie Institute of Technology, Pittsburgh, Pa.
CJS—Report to Camp Jackson, Columbia, S. C.
CJW—Report to Camp John Wise, San Antonio, Texas.
CLR—Commissioned as Colonel, Aviation Section, Signal Reserve Corps.
CMV—Report to Aviation Concentration Camp, Morrison, Va.
CPA—Commissioned as Captain Air Service, National Army.
CPR—Commissioned as Captain, Aviation Section, Signal Reserve Corps.
CRI—Report to Chanute Field, Rantoul, Ill.
CSO—Report to the Chief Signal Officer, Washington, D. C.
CUI—Report to School of Military Aeronautics, Cornell University, Ithaca, N. Y.
CWT—Report to Call Field, Wichita Falls, Texas
DAF—Report to Dorr Field, Arcadia, Fla.
DAP—Report to Director of Aircraft Production, Washington, D. C.
DIK—Report to Camp Dick, Dallas, Tex.
DIS—Honorably discharged from service.
DMA—Report to Director of MilitaryAeronautics, Washington, D. C.
ELA—Report to Eberts Field, Loanoke, Ark.
EOT—Report to Ellington Field, Olcott, Texas.
FLA—Commissioned as First Lieutenant Air Service, National Army.
FLR—Commissioned as First Lieutenant, Aviation Section, Signal Reserve Corps.
FLT—Commissioned as First Lieutenant, Aviation Section, Signal Corps.
FOB—Report to Fort Omaha Balloon School, Omaha, Neb.
FRF—On duty requiring regular and frequent aerial flights.
FSO—Report to Fort Sill School for Aerial Observers, Fort Sill, Okla.
GIT—Report to School of Military Aeronautics, Georgia Institute of Technology, Augusta, Ga.
GLC—Report to Gerstner Field, Lake Charles, La.
HHN—Report to Hazelhurst Field, Mineola, L. I., N. Y.
JMA—Rated as Junior Military Aviator.
JRC—Report to Jackson Field, Riverside, Cal.
KST—Report to Kelly Field, So. San Antonio, Tex. (When specified in the order, the number of the field is given in parentheses)
LDT—Report to Love Field, Dallas, Tex.
LHV—Report to Langley Field, Hampton, Va.
MAC—Report to March Field, Allesandro, Cal.
MAJ—Commissioned as Major, Aviation Section, Signal Corps.
MAT—Report to Mather Field, Sacramento, Cal.
MDO—Report to McCook Field, Dayton, Ohio.
MIT—Report to School of Military Aeronautics, Massachusetts Institute of Technology, Boston, Mass.
MJA—Commissioned as Major Air Service, National Army.
MJR—Commissioned as Major, Aviation Section, Signal Reserve Corps.
MSC—Report to Radio School, Maryland State Agricultural College, College Park, Md.
OBS—Attached to the Aeronautical Service as Observers.
OSU—Report to School of Military Aeronautics, Ohio State University, Columbus, Ohio.
PFO—Report to Post Field, Fort Sill, Okla.
PMT—Report to Park Field, Millington, Tenn.
PUP—Report to School of Military Aeronautics, Princeton University, Princeton, N. J.
PWM—Report to Payne Field, West Point, Miss.
REL—Relieved from present duty.
RSD—Report to Rockwell Field, San Diego, Cal.
RTR—Retransferred to organization attached to previous assignment to aviation duty.
RWT—Report to Rich Field, Waco, Tex.
SBI—Report to Scott Field, Belleville, Ill.
SAG—Report to Souther Field, Americus, Ga.
SGS—Report to Camp Sevier, Greenville, S. C.
SLA—Commissioned as Second Lieutenant Air Service, National Army.
SLR—Commissioned as Second Lieutenant, Aviation Section, Signal Reserve Corps.
SLT—Commissioned as Second Lieutenant, Aviation Section, Signal Corps.
SMM—Report to Selfridge Field, Mount Clemens, Mich.
SRC—Report to Columbia School for Radio Officers, New York City.
TFT—Report to Taliaferro Field, Fort Worth, Texas. (When specified in the order, the number of the field is given in parentheses)
TMA—Report to Taylor Field, Montgomery, Ala.
UCB—Report to School of Military Aeronautics, University of California, Berkeley, Cal.
UIU—Report to School of Military Aeronautics, University of Illinois, Urbana, Ill.
UTA—Report to School of Military Aeronautics, University of Texas, Austin, Tex.
VBW—Report to Vancouver Barracks, Washington.
WAC—Report to Aviation Concentration Camp, Waco, Tex.
WCS—Wire to the Chief Signal Officer upon arrival.
WDM—Wire, Director of Military Aeronautics, upon arrival.
WFO—Report to Wilbur Wright Field, Fairfield, Ohio.

Notes

Note 1—Report to places mentioned in order named for temporary duty.

Note 2—Report to Chief Technical Section, Dayton, O.

Note 3—Report to Park Place, Houston, Texas.

Note 4—Report to Akron, Ohio.

Note 5—Report to Sacketts Harbor, Madison Barracks.

Note 6—Report to 713 Lindsey Bldg., Dayton, Ohio.

Note 7—Report to School Military Aeronautics, Mass. Inst. Tech., Cambridge, Mass.

Note 8—Report to 480 Lexington Avenue, New York City.

Note 9—Report to Recruit Receiving Depot, Fort Wayne, Mich.

Note 10—Report to General Supply Depot, Americus, Ga.

Note 11—Report to Dis. Mgr. Finance, Bur. Aircraft Production, Detroit, Mich.

Note 12—Report to Dis. Approvals Office, Buffalo, N. Y.

Note 13—Report to Det. No. 3, Springfield, Mass.

Note 14—Report to Standard Aircraft Corp., Elizabeth, N. J.

Note 15—Report to Gen. Supply Depot, Middletown, Pa.

Note 16—Report to Gen. Supply Depot, San Antonio, Texas.

Note 17—Report to A.Q.M.G., Washington, D. C.

Note 18—Report to Western Electric Co., Chicago, Ill.

Note 19—Report to Jacksonville, Fla.

Note 20—Report to Fisher Body Corp., Detroit, Mich.

Note 21—Report to Students Army Training Corps, Harvard Univ., Cambridge, Mass.

Note 22—Report to Det. No. 6, 1550 Woodward Ave., Detroit, Mich.

Note 23—Report to Army Balloon School, Lee Hall, Va.

Note 24—Report to Aviation Repair Depot, Dallas, Texas.

Note 25—Report to Det. No. 2, Air Service Production, New York City.

Note 26—Report to Det. No. 4, Air Service Production, Buffalo, N. Y.

Special Orders Nos. 190 to 197, Inclusive

A	
Ainsworth, Frank Wesley	SLA; HHN
Ambler, Harold H	CPA
Arter, Theodore	CPA
Aubrey, Stanley Freeman	SLA; CGC
Allison, Ernest McConnell	SLA; RSD
Abhott, Louis H	SLT; ALF
Archer, Ralph Curtis	SLA; HHN
Ankeny, John C	FRF
Anspach, Paul P	FRF
Abbey, Perley Loring	MJA; VBW
Atkinson, William Terrell	SLA; CAF
Ames, Harold Taylor	SLA; CFT
Amsden, Sherman C	LDT
Amory, Roger	DMA
Anderson, Orvil Arson	SLA; FOB
Ackerman, Edgar M	KST
Adams, William Jacques	FLA; Note 8
B	
Bunce, Ralph Lyman	SLA; PMT
Burke, Malcolm C	FLA
Beckett, Ralph Edwin	SLA; RSD
Bassi, Andrew Blain, Jr	SLA; KST
Boller, George Walter	SLA; EOT
Bourman, Charles A	LHV
Belknap, Clifford B	DIK
Blaich, Ernest G	DIK
Birkelund, George Rasmussen	SLA; DAF
Bartlett, Edward Charles	SLA; DAP
Brophy, Norman Delroy	SLA; KST
Browning, Lorenzo Dow	SLA
Blanchard, Charles Barnes	SLA; DAP
Berens, Fred William	SLA; HHN
Brokmeyer, Albert F	HHN
Beaven, Josepb Carey	SLA; APR
Barrett, James T	BST
Benjamin Hamilton F	DMA
Baker, Ernest B	SMM
Buckland, William E	LDT
Bell, Cecil K	CGC
Bruce, Jerald Joy	SLA; CJW
Barker, John D	LDT
Bolting, John T	LDT
Burtis, Edwin S	LDT
Burdick, Harold B	LDT
Biscayart, Jules Dominique	SLA; HHN
Brown, Howard Condit	SLA; LDT
Bufkin, Wesley Ford	SLA; HHN
Barker, Stephen Ray	SLA; WFO
Brown, John Earle	SLA; CUI
Balsinger, Elis C	FRF
Baker, Quin Kenneth	SLA; CRI
Bishop, Edward Payson	SLA; WFO
Baxter, Howard Francis	FLA
Betz, Charles F	DMA
Boudreaux, Auguste Emile	FLA
Babcock, Howard Clark	FLA
Bly, Merwin Cluxton	SLA; LDT
Bierman, Hugh Eastwood	SLA; LDT
Burton, Charles Humphreys	SLA; KST
Briney, Wilton Moore	SLA; KST
Bonnell, Harry Mortin	SLA; KST
Benson, Ray M	LDT
Browne, Lucien W	LDT

Buford, Bennett G	LDT
Belt, Dean B	FRF
Bennett, John C	FRF
Brown, Sewell	WFO
Bennett, Frank P	TFT
Beswick, John S	TFT
Brady, Frank L	TFT
Brennan, Edward W	TFT
Brown, Harry G	TFT
Blevins, Beeler B	SLA; CAF
Baker, Cecil Carlyle	SLA; LDT
Belt, William S	BFT
Butler, Joseph F	PUP
Barnard, Frank Lee	SLA; GLC
Bassi, Andrew B., Jr	BST
Blaim, James .J	BST
Bissonet, George H	BST
Banchor, Gordon H	SMM
Brown, Birch L	SMM
Brown, Chalmer E	SMM
Bucklin, William N., Jr	DMA
Berndes, Walter Oscar Bernhard	SLA; Note 15
Bowne, Francis D	CGC
Behse, Joseph Edward	SLA; DAF
Burr, Kinsey	Note 4
Barone, Tony	SLA; WFO
Benson, Matthew Martin	SLA; CRI
Bornhold , Herbert John	SLA; FOB
Baxter, Robert K	EOT
Ban, Ollie L	EOT
Bolz, Adolph C	EOT
Burmeister, John C	EOT
Buchtenkirch, George C	Note 23
Boggs, Willis A	Note 20

C

Crawford, Robert Harold	SLA; CRI
Clark, Lucius L	WFO
Chamberlain, Willis Arden	FLA
Clark, William Dorman	SLA; HHN
Clarke, Frederic Leslie	SLA; PMT
Cutting, Aaron Barrows	SLA; PMT
Church, Elliott S	CPR
Crissy, Dana H	DMA
Cull, Edwin E	FRF
Chisholm, Henry	SLA; PMT
Colgate, Henry Auchincloss	SLA; CRI
Cunningham, Samuel D	ELA
Chenoweth, Bertrum W	EOT
Czarniecki, Myron J	CGC
Coles, Barry Fearn	SLA; PMT
Clarke, DeFrance	FRF
Christensen, Jens Tinus	SLA; BFT
Colton, Deane W	PFO
Cooley, Arthur B	PFO
Copeland, Jay M	PFO
Curtis, Erland L	PFO
Curtis, Thomas Carson	SLA; ELA
Chrisman, Thomas L	DIK
Clopeck, Frank	DIK
Campbell, Lloyd K	DIK
Cragin, Arthur B., Jr	FOB
Cochran, Emory E	FLA
Coe, Alfred L	SLA; HHN
Cole, John Abbo‘t	SLA; CGC
Collins, Roy Parker	SLA; CGC
Chalfant, Harvey O	TFT
Chamberlain, Leo W	TFT
Chapman, Harold C	TFT
Charroin, Arthur B	TFT
Clark, Horace	TFT
Cole, Robert A	TFT
Collier, Trezerant	TFT
Crawford, Frank H	TFT
Campbell, Robert B	FRF
Colliver, Harold E	FRF
Chrisman, Thomas Love	SLA; CAF
Culley, Oscar L	DMA; HHN; Note 1
Curry, James Philip	SLA; LDT
Clark, Chester R	FRF
Crede, Lloyd S	FRF
Curtin, James C	FRF
Cowan, Robert S	LDT
Cook, Frank F	LDT
Cushman, Robert G	WFO
Couzens, John C	CAF
Chute, Aubrey Jay	SLA; GLC
Chamberlain, George Slayton	SLA; Note 24
Coffman, Don M	Note 14
Cantey, Samuel M	EOT
Carter, John O	EOT
Corsaut, Jesse H	EOT
Coble, Paul L	FLA; DAP
Cox, Lester Edmund	SLA; SBI
Caldwell, Percy	FLA; PUP
Cook, Sam Jacob	FLA; Note 14
Cheston, Daniel M., Jr	Note 10
Crim, William D	WFO
Christiansen, Charles Emal	SLA; EOT
Cutler, Herbert J	FLA
Cole, Raymond T	SMM

D

Davis, Paul J	WFO
Davis, Elmer Clarkson, Jr	SLA; RSD
Diemer, William Sorber	SLA; EOT
Dooley, Peyton Young	SLA; PMT
Draper, Harold D	PFO
Dent, Magruder	DMA
Dickson, Charles M	DMA
Dougherty, James E	SMM
Day, Dana Court	FLA; DAP
Davis, Claude A	LDT
Duke, John F. S	LDT
Devers, Philip Knoderer	SLA; CJW
Davis, Clarence Andrews	SLA; KST
Dillon, Milton S	HHN
de Podesta, Anthony	SLA; CRI
Daddow, Samuel H	RSD
Dodge, Cecil P	LDT
Dobr, James L	FLA
Douglas, Bernard M., Jr	TFT
Daniels, Albert J	FRF
Dwight, Charles Stevens, Jr	SLA; DAP
Daniels, Thomas L	FOB
Davidson, Harry Thompson	SLA; PMT
Douglass, Norman James	SLA; WFO
Dunham, Carroll	Note 21
Devers, John M	UIU
Dickens, George Ronald	SLA; SBI
Deuel, Thorne	RWT; WDM; Note 1
Drebry, Ernest Egbert	SLA; PMT
Dodge, Vernon Montgomery	SLA; EOT
Dunbaugh, George Johnston, Jr	SLA; CJW
Dugliss, Malcolm	SLA; KST
Davis, Leland Worthen	SLA; KST

E

Eagan, Edward Francis	SLA; LDT
Evans, Christopher C	SLA; RSD
Everett, Charles	FLA
Evans, Christopher James, Jr	SLA; PMT
Erickson, Fridtjof C	MAT
Everett, Robert	SLA; PMT
Ellitt, Alexander	FRF
Egge, Harrison Robert	SLA; CWT
Edmiston, Hugh C., Jr	CGC
Estabrook, Frederick Reed	FLA
Eby, Samuel H	LDT
Evans, Dean P	WFO
Earley, George E	LDT
Earle Murray	Note 3
Evans, Nelson Frazier	FLA; Note 8
Ezell, Wallace Dean	SLA; WFO
Eshelman, Gordon Louis	SLA
Elliott, Lawrence M	SLA; OSU

F

Forshee, Clarence Welch	SLA; KST
Fenstermacher, Nevin	SLA; CGC
Fish, Farnum Thayer	SLA; RSD
Friberg, John Thompson	SLA; MAT
Foster, Thad Victor	SLA; TFT
Frewer, John W	APR
Finch, George Edwards	SLA; CGC
Fountain, Ray C	SMM
Fallon, William Prescott	SLA; CGC
Faxon, Warren Ellis	SLA; DAF
Fisher, Floyd C	SLA; LDT
French, Irvine	LDT
Ferris, James J	FRF
Freedman, Mark A	FRF
Finnegan, Thomas Ledwith	SLA; VBW
Farnsworth, Tom D	LDT
Farnsworth, Harold T	LDT
Foltz, Joseph R	LDT
Fleming, Carl S	LDT
Farris, Homer V	EOT
Fee, Ray E	PFO
Faulkner, Charles James	SLA; KST
Frick, Childs	Note 2
Fleming, George A	Note 3
Fisher, Robert T	CPA; DMA
Fowler, Lee T	Note 16
Ferguson, Melvin D	Note 13
Ferris, Gilbert Bishop	SLA; CFT
Fazel, Charles Stever	SLA; UIU
Ferris, George M	FLA
Freidman, Harry B	Note 6
Fancuf, Leo Joseph	SLA; LDT
Fernald, James Gordon	SLA; KST
Farmer, Leroy, Jr	BST
Faulkner, Charles J	BST
Field, James M., Jr	SLA; AAD
Fisher, Philip Stafford	SLA; GLC
Fischer, Arthur Philip	SLA; VBW
Fisher, Ewing B	TFT

Air mechanics of the Royal Air Force arming a British bombing plane with their explosive eggs. The bombs are fastened under the lower plane and released by the pilot or observer by means of a bomb release lever

G

Greene, Charles C	LHV
Gambrill, Richard, Jr	SLA: WFO
Greenslade, Russell Molland	FLA
Gleaves, Richard D	SMM
Gorman, Aiden J	N PFO
Greene, William J	FRF
Grier, John C., Jr	FLA
Glogau, William Emile	SLA: CGC
Ganny, Ralph G	DIK
Graham, Harvey Laslay	SLA; CJW
Giroux, Elroy Arthur	SLA; WFO
Gathings, James C	FRF
Grisemer, Walter	FRF
Geisler, Clement G	LDT
Guttersen, Granville	FRF
Grayson, Forrest	SLA: CRI
Gaylord, Paul Childs	SLA; WFO
Goldin, Guillie Benjamin	FLA
Goodnight, Harry L	LDT
Grolman, Aaron	SLA; GLC
Gardner, James Eldridge	SLA; CWT
Gahris, Leroy E	CPA; APR
Gulgard, Frank Henry	SLA; CJW
Gurvine, Richard J	Note 15
Greene, Bertram Robertson	SLA; MAC
Geraty, Thomas Joseph	SLA; LDT
Gillet, Charles B	KST

H

Harthorn, Lawrence Dell	FLA; BST
Hill, Ployer Peter	SLA; CRI
Hallock, Roy E	DMA
Hutton, Harry Irving	SLA; CAF
Haigh, Henry W	WFO
Hearne, George M	WFO
Haddock, James P	EOT
Harrison, Elbert I	EOT
Henderson, Jacob E	EOT
Henderson, John S	EOT
Helgesson, Henry T	EOT
Hodge, Glenn B	EOT
Howard, Harold H	EOT
Hammond, Lowell W	CUI
Houck, Roland John	SLA; DAP
Hale, Lawrence I	CAF
Hartman, Harrison Jay	SLA; PMT
Hall, Hartwell L	DMA
Hartz, Rutherford S	RSD
Halverson, Harry Arthur	SLA: RSD
Hartwell, Cushman	DMA
Hamer, Robert S., Jr	DIK
Houghton, Frank C	DIK
Holtzendorff, Preston B., Jr	DIK
Hough, Walter B	DIK
Hutton, Harry I	DIK
Houghton, Junius H	DAF
Hurd, Leland C	ADT
Healy, William R	FOB
Hornsby, Aubrey	SMM
Hands, Julius M	FRF
Hawley, Herbert	FRF
Hawkins, Kenneth Clarence	SLA; CJW
Hauck, John	SLA; PMT
Holtzclaw, Henry Fuller	FLA; VBW
Hirsh, Charles Louis	SLA; KST
Hansen, Frank Alfred	SLA; LDT
Hotaling, Harry D	FRF
Hart, Howard Matthew	SLA; HHN
Haldeman, George William	SLA; PMT
Hanchett, Frederick W	LDT
Henning, William H	RSD
Hull, Justus N	LDT
Haggerty, Stewart A	LDT
Houser, Percy T	FRF
Hannum, George T	ELA
Harrison, George Hyman	SLA; TFT
Hart, Victor Key	SLA; MAC
Harmon, Jack	SLA; RSD
Hedrick, Edward James	SLA; LDT
Headrick, Edward J	BFT
Hawkes, Francis M	BFT
Handy, Homes A	CFT
Honigman, Joseph Knight	SLA; PUP
Horney, Reid Bunn	SLA; KST
Harrell, Benjamin Francis	SLA; KST
Hawkes, Francis Monroe	SLA; LDT
Hadley, Earl Gilbert	SLA: CJW
Holliday, William Fleming	SLA; FOB
Hoffman, Malvin G	EOT
Hoggatt, Floyd L	EOT
Hoffman, Albert J	WFO
Hearne, George Marion, Jr	SLA; CWT
Houlton, Raymond C	TFT

I

Immel, Paul P	KST
Ilet, Edward W	FRF

J

Jennings, John Dillard	SLA; KST
Jesse, William Rodes	SLA; PMT
Jones, Aaron	BST
Jones, Raymond W	FLA
Jamison, Ross P	EOT
Jones, Howard H	EOT
Jordon, Ira W	SMM
Jesup, Richard Mortimer	CPA: AAD
Jacobi, Herbert Jay	SLA; APR
Jenks, Henry I	FRF
Johnson, Clare T	FRF
Jackson, John Sidney	HHN
Jones, Byron Q	Note 2
Johnson, Jerome Benjamin	SLA; EOT
Jewell, Sidney L	PFO
Jacobi, Benjamin Ross	SLA: CAF
Julian, Rupert	SLA; CFT
James, Roy P	TFT
Johnson, Laurence S	EOT
Jackson, John W	DIK
Juett, John C	SMM
Jensen, Karl	SMM

K

Kranz, Irwin Baron	SLA: WFO
Knickerbocker, Harry C	WFO
Kelty, William Richard	SLA; HHN
Kelly, Earl C	PFO
Kinkade, Kennish C	PFO
Kelly, James Joseph	SLA; KST
Kitchen, John Hill	SLA; CGC
Kirshner, Robert Fairchild	SLA; HHN
Kerr, Frederick M	WFO
Knode, Thomas Edson	SLA; RSD
Kurtz, John Winfield	SLA; FOB
Kramer, George E	FRF
Kuhn, Herbert R	LDT
King, Edward R	LDT
Kent, Everett F	LDT
Kesemann, William, Jr	FRF
Kane, Hoyt R	Note 9
Kipp, Joseph A	Note 9
Kilcup, Norman L	Note 22
Kenly, Henry C	MAC
Kenly, William L., Jr	MAC
Kraft, Lester L	BFT
Kelly, Roland Dillon	SLA; CWT
Keightley, George Martin	SLA; RSD
Kelly, Carl D	CPA
Kane, Thomas Francis	SLA; KST
Kennady, Emile Tisdale	TLA; SBI
Krug, Frank W	WFO
Kern, John T	WFO

L

Larson, Westide T	EOT
Lane, Orlando H	EOT
Livesay, George B	EOT
Looram, Lucien Appleby	SLA; HHN
Lahti, Matthew	FLA
Lawton, Edgar H	SMM

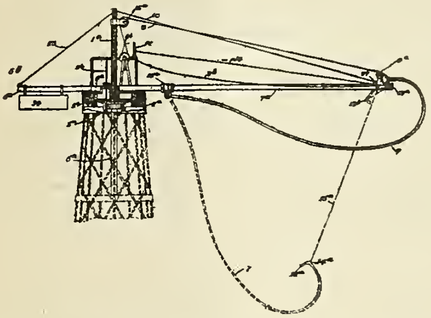
(*Continued on page* 1334)

When an aeroplane squadron moves. The photographs show the chosen location of an aeroplane squadron for its new aerodrome. A number of mechanics arrive at the place chosen in motor trucks and from then on the place is a scene of tireless activity. One of the first things done is to erect the hangars for the planes. These are sometimes made of steel and sometimes of wood, but no matter of what kind of material they are made to be put together in a hurry. The material arrives in pieces, fitted, and all that remains to be done is to erect and put those pieces together. The wooden skeleton is covered with heavy tarpaulins which are heavily camouflaged according to their surroundings. In the right photograph may be seen the rolled tarpaulins and in the left photograph a hangar nearly ready for the tarpaulin covering. In the distance may be seen the aeroplanes waiting for their home to be completed. The whole move can be completed in less than a day.

RECENT AERO PATENTS

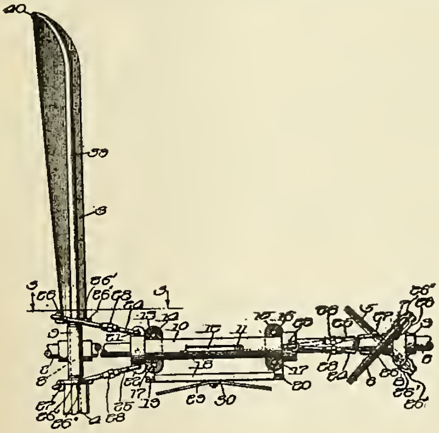
BY WILLIAM N. MOORE

1,144,505. AERIAL LANDING AND LAUNCHING APPLIANCE. Frank Steffan, San Diego, Cal. Filed Feb. 18, 1914. Serial No. 819,402. (Cl. 244—2.)



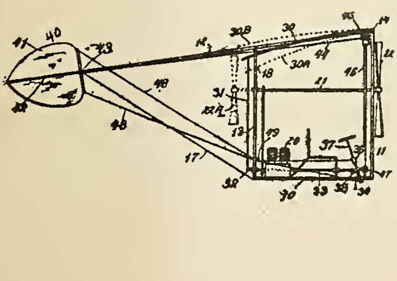
1. In a device of the class described the combination of a rigidly mounted base, a member revolubly mounted in said base, a horizontal member rigidly secured to said revolubly mounted member, a curved arm pivotally and revolubly mounted at its one end on said horizontal member and means for raising and lowering one end of said curved arm.

1,144,521. AERIAL PROPELLER. Wilber S. Barrows and Asahel H. Barrows, Chicago, Ill. Filed Mar. 24, 1913. Serial No. 756,304. (Cl. 170—163.)



1. The combination with a propeller shaft, of a pair of propellers, a hub on said shaft into which blades are swiveled, a member slidably mounted on said shaft and stationary relative to said shaft's rotary movement, levers upon said blades, connections between said levers and said member, means for varying the lengths of said connections, and means for varying the length of throw of said levers.

1,145,972. AEROPLANE. Harry B. Chalmers, Dedham, Mass. Filed Aug. 3, 1910. Serial No. 575,218. (Cl. 244—29.)

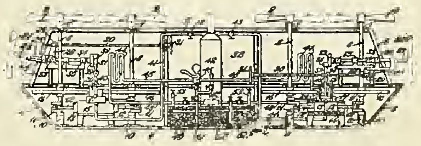


1. In an aeroplane, a frame therefor comprising a transverse spar in the front thereof and a longitudinal spar running rearwardly therefrom, a pair of supporting wings projecting rearwardly from the transverse spar at either side of the longitudinal spar, a control shaft, a supporting shaft upon which said control shaft is mounted, and connections between said supporting shaft and the wings whereby the positions of said wings may be simultaneously adjusted in opposite directions by moving the control shaft sidewise.

2. In an aeroplane, a frame therefor comprising a transverse spar in the front thereof and a longitudinal spar running rearwardly therefrom, a pair of supporting wings projecting rearwardly from the transverse spar at either side of the longitudinal spar, a horizontal rudder mounted upon the rear end of the longitudinal spar, a control shaft, a supporting shaft upon which said control shaft is mounted, connections between said supporting shaft and the wings whereby the positions of said wings may be simultaneously adjusted in opposite directions by swinging said control shaft as a whole sidewise and other connections between the control shaft and the horizontal rudder whereby the rudder may be moved up and down by swinging the control shaft forward and backward.

3. In an aeroplane, a frame therefor comprising a transverse spar in the front thereof and a longitudinal spar running rearwardly therefrom, a pair of supporting wings projecting rearwardly from the transverse spar at either side of the longitudinal spar, a rudder mounted upon the rear end of the longitudinal spar, a control shaft, a supporting shaft, a tilting member on the end thereof in which the control shaft is mounted, connections between said supporting shaft and the wings whereby the positions of said wings may be simultaneously adjusted in opposite directions by moving said control shaft sidewise, and other connections between the tilting member and the rudder whereby the rudder may be tilted by moving the control shaft back and forth.

1,149,218. AEROSTAT. John Cooper Porter, Northampton, Mass. Filed Sept. 3, 1913. Serial No. 787,860. (Cl. 244—19.)



1. An aerostat comprising a hull adapted to float on the water, a pair of elevating propellers mounted at the upper ends of parallel vertical shafts, provided with cranks near the lower ends, a horizontal fluid pressure cylinder mounted in said hull between said shafts, said cylinder having two oppositely facing pistons arranged therein, and driving rods attached to said pistons and connected to the cranks of said shafts to rotate the latter.

2. An aerostat comprising steering and propelling means, a pair of gyroscope wheels mounted on parallel vertical shafts for rotation in horizontal planes, elevating propellers mounted at the upper ends of said shafts, the lower ends of said shafts being cranked, and a horizontal fluid pressure cylinder mounted between the lower ends of said shafts, said cylinder having two oppositely facing pistons arranged therein and operatively connected to said cranks to rotate said gyroscopes and propellers.

3. An aerostat comprising and propelling means, a pair of parallel vertical crank shafts having gyroscope wheels fixed thereon and adapted to rotate in the same horizontal plane, elevating propellers mounted at the upper ends of said shafts, and a horizontal fluid pressure cylinder mounted between said shafts, said cylinder having two oppositely facing pistons arranged therein and connected to the cranks of said shafts to rotate the latter.

4. An aerostat comprising a hull adapted to float on the water, a framework erected upon said hull and supporting parallel vertical crank shafts, a plurality of pairs of elevating propellers mounted at the upper ends of said shafts, and a horizontal fluid pressure cylinder mounted between the shafts of each of said pairs of shafts, each of said cylinders having two oppositely facing pistons arranged therein and connected to the cranks of said shafts, respectively, to rotate the latter, and a third cylinder operating in synchronism with said horizontal cylinders, said last named cylinder containing a double acting piston for rotating a horizontal propeller shaft unprovided with a gyroscope wheel.

5. In an aerostat, in combination with a hull, one or more pairs of elevating propellers, driven by vertical shafts having step bearings in said hull, each shaft carrying a gyroscope, and being operated by fluid pressure upon one of two oppositely facing pistons in a single cylinder.

FOREIGN NEWS

AUSTRIAN

The War Office statement of August 30 says:

Yesterday our aeroplanes dropped fifty bombs on Monte Belluno Station.

BRITISH

During the last week no fewer than seventeen separate raids into German territory have been carried out by the allied independent air force, which is under the command of a British general.

While extensive damage is known to have been done to important military objectives, such as the railway junction at Treves, the station at Frankfort, and the chemical factory at Saaralben, the most striking feature of the week's work was the raid on the Mannheim poison gas factories, where British airmen, flying at a height of 200 feet, narrowly avoided collision with the factory chimneys.

Although this manœuvre necessarily increased the personal risk of the airmen, it enabled them to direct their bombs with great accuracy toward the more vulnerable parts of their objective. Every bomb released was seen to hit its target.

The drastic moral effect produced by the bombing aeroplanes flying at the housetop levels may easily be imagined, and the German defense tactics were for the time paralyzed by the totally unexpected and, indeed, unprecedented nature of the attack, as is shown by the fact that all the British machines returned safely.

In the northern coastal region, Bruges has been bombed nine times, and successful raids have been made upon military works at such places as Zeebrugge and Ostend.

The almost monotonous frequency with which these names appear in the official communiques tends to blunt the imagination of the public to the real magnitude and significance of the effort which Great Britain is making against this formidable sector of the western front. Scarcely a day passes without at least one raid upon these vital German strongholds. Sometimes three or four raids are made in a single day. Often a squadron attacking one of the objectives, say, at 11 o'clock in the morning, will be relieved by another squadron, say, at noon, which will carry on until relieved by a third squadron, and this over one of the most strongly fortified military positions in Europe and against defensive organizations of the most formidable kind.

Although figures can convey only the slightest notion of the intensive character of the British aerial attacks upon these coastal fortresses, it may be noted that during the last three months the following raids have been made: Upon the German works at Zeebrugge, 72; at Bruges, 63; at Ostend, 64. In addition to these 199 raids, an immense number of separate attacks have been delivered upon other military works in the coastal area.

While German Headquarters reports continue to make claims of German successes in the air fighting on the western front, the official tally made on the British side for the last week shows 74 enemy machines destroyed and 34 driven down out of control, while 32 British machines are reported missing.

An official statement issued by the Air Ministry on bombing and raiding operations says:

The morning of August 30 our machines attacked the railway station at Conflans and a hostile aerodrome. Direct hits were made both on the hangars at the aerodrome and the railway at Conflans. In the course of fighting one enemy aeroplane was destroyed. All our machines returned safely.

Another attack was also carried out by one of our squadrons on the stations at Conflans and Thionville. This squadron engaged a largely superior number of hostile machines. Fierce fighting ensued, in the course of which one enemy aeroplane was destroyed and one sent down out of control. Four of our machines are missing.

Eleven hostile machines were shot down by us on August 29 and ten were driven down out of control. One German balloon was set on fire. Nine of our machines are missing. Our airmen were actively engaged in all departments of their work throughout the day.

Fifteen and a half tons of bombs were dropped on a variety of targets, including the Bruges Docks and many railway connections beyond the battle zone. Unfavorable weather prevented night flying.

Fifteen German aeroplanes were destroyed and five others brought down on August 30th in aerial fighting by the British and French forces, according to the statements of the War Offices. The British destroyed twelve German machines and put five others out of control, and the French put three craft of the enemy out of commission.

The weather was cloudy on August 31 but the various activities of our air service were fully maintained all along the front. There was much useful observation by aeroplanes and balloons. Twelve enemy machines were destroyed during the day and five driven down out of control. Four of our machines are missing.

The Bruges docks and the Zeebrugge mole were heavily bombed, as well as a number of selected targets opposite the battle zone. In all, twenty-five and one-half tons of bombs were dropped during the twenty-four hours.

This information was received September 1 from the "Rhine front":

In the air raid in Cologne, August 21, the casualties were 45 killed and 176 wounded. In the last raid on Frankfort the railway station was badly damaged and twelve killed. In Cologne and elsewhere considerable damage has been done by the Germans' own shell fire.

A Turkish official communication received September 1 reports that an aeroplane was brought down in flames during a raid on Constantinople on August 28. It says the captain of the machine, a British officer, was wounded and made prisoner.

The operations of the British aviators in the fighting zone are described in an official communication on September 2 as follows:

After the heavy rain of August 31 the weather improved and our aeroplanes and balloons carried on their work in a clear atmosphere and high wind.

In spite of the opposition of enemy machines, over 1,000 photographs were taken by our aviators and many reconnoissances effected. Contact with our advancing troops was closely maintained.

Our observation balloons were constantly pushed forward, and these, with our artillery patrols, kept our batteries informed as to numerous targets, which were successfully engaged.

Throughout the day the area in which the Germans were entering was searched by our low-flying airmen, who everywhere attacked enemy troops and transports with bombs and machine gun fire, causing heavy casualties and much confusion. Bridges and railway connections were heavily bombed in the enemy back areas.

In the air fighting eight enemy machines were destroyed and four driven down out of control. Six hostile balloons were brought down in flames by our aeroplanes. Eight of our machines are missing.

On the following night bombing was continued both in the zone immediately behind the battle line and further east. A German aerodrome beyond St. Quentin was heavily attacked and direct hits were observed. We lost one night bombing machine.

During the twenty-four hours over thirty-four tons of bombs were launched on different targets.

In addition to the hostile machines already reported to have been accounted for on Friday last, our anti-aircraft fire brought down a German night bombing machine on that date.

Six hostile machines were destroyed in air fighting on August 31 and three driven down out of control. Seven of our machines are missing. In spite of low clouds the work of the British air forces along the front was carried on throughout the day in close co-operation with the troops on the ground by our aeroplanes and balloons. A large number of photographs were taken and enemy movements kept under observation. Twelve and one-half tons of bombs were dropped between dawn and dusk. At night flying was impossible.

FRANCE

The French official report of August 30 contains the following:

Our bombarding machines have attacked the Pinon forest and the railroad station at Anizy-le-Chateau (both between Soissons and Laon) and crossings of the Ailette located in this region. More than forty-eight tons of explosives were dropped.

Twenty enemy machines have been downed or sent down out of control. An enemy captive balloon was set on fire.

The French, the despatches say, brought down five enemies within the Allied lines, forty-seven German machines were seen to fall within their own lines and ninety-three others, if not destroyed, were badly damaged. On August 30, during the day, three enemy aeroplanes were brought down and two captive balloons were set on fire. During the night our aeroplanes were able to drop 3,150 kilos of projectiles on objectives in the region east of Conflans Station, Chambray, and Thiaucourt, and factories at Thionville.

The official communique of September 1 on aviation says:

"Eight enemy aeroplanes were brought down or fell in a damaged condition. From a low altitude our bombing aeroplanes to-day dropped twenty-three tons of projectiles on enemy concentrations and convoys in the region of Vauxaillon, Neuville-sur-Margival, Laffaux and Nanteuil-la-Fosse (all northeast of Soissons).

"Thousands of cartridges were fired in the same regions on enemy troops."

An official dispatch from Paris furnished an idea of the tremendous aerial activities conducted by the French Navy, principally in operations against submarines. It says:

"In June the aerial patrols of the French Navy covered 447,040 miles, 59,100 miles being by airships, which made 256 flights and 1,481 hours of navigation. Aeroplanes and seaplanes were in the air 5,758 hours and made 3,365 sorties. Captive naval balloons accomplished 66 patrolling errands and 114 scouting flights for dredges, amounting to a total of 4,408 hours of flight.

"In July the activity of the various aerial organizations of the French Navy was equally intense. Captive balloons were engaged 5,520 hours, airships 1,311 hours, and aeroplanes and seaplanes 7,432 hours. The naval aerial patrols in their flights covered 485,330 miles."

Enemy submarines were attacked fourteen times and numerous groups of mines were discovered.

GERMANY

Frontier correspondents of the *Telegraaf* assert that travellers from Germany report heavy damages from recent air raids in towns along the Rhine. Forty persons were killed in the last aerial attack on Cologne, and entire streets in Mannheim were laid in waste. At Bingen the aniline works were levelled.

On September 2 we shot down thirteen enemy balloons and fifty-five aeroplanes, thirty-six on the Arras battlefield. Twenty-six of these were brought down by the Chaser Squadron No. 3 under the leadership of First Lieutenant Lörzer, who achieved his thirty-fifth aerial victory.

On September 3 we shot down twenty-two aeroplanes and seven balloons. Lieutenant Rumey won his thirtieth aerial victory.

On September 4 we shot down thirty-two enemy aeroplanes.

ITALIAN

The official communication issued by the War Office on August 30 says: Two hostile aeroplanes have been brought down.

The official report issued September 1 upon aviation says:

"Yesterday morning our aeroplanes reached Franzensfeste (Tyrol) and, flying very low, dropped bombs with accuracy on the important railway establishment there.

(This is the junction of the railway from Trent with the line running down the Drave Valley. The planes had to go about seventy-five miles over high mountains.)

"Other bombarding operations were carried out during the day on the enemy's front lines and back areas by our own and Allied aviators.

"Last night army and navy airships bombarded the military works at Pola and the station and depots at Primolano. Seven hostile machines were brought down in air fighting."

A telegram to the Italian Embassy on Sept. 3 stated that during recent enemy raids on the Italian front the Austrians lost numerous machines and several of their best pilots. Eight of these had been mentioned in Austrian dispatches for special bravery.

The dispatch said that in August Lieutenants Oppocher and Schuffs were killed over Levico. Lieutenant Linke and Count Salm, belonging to the 13th Dragoons, also were killed in air encounters. Lieutenant Hebra, who had been decorated several times, was brought down after a fierce duel over Klagenfurt. Lieutenant Eprfeld also has been killed and Baron Kutchers has had both legs fractured.

A communique to the Belgian Legation stated that Lieutenant Willy Coppens of the Belgian Aviation Service had brought down in flames three balloons, achieving his twenty-sixth, twenty-seventh and twenty-eighth victories.

MODEL NEWS

Edited by John F. McMahon

Model Aeroplane Building as a Step to Aeronautical Engineering

THE metal for the tank should be at least five thousandths of an inch thick and no more than eight thousandths, or the tank will be too heavy.

The metal is wrapped around the mandrel, lapping the edges about ¼ of an inch, then held in place by wire and soldered where lapped. After soldering the metal should be slipped off the mandrel and the ends clipped off to make the cylinder the proper shape for soldering the caps in place.

Slip the metal back on the mandrel and wrap with very thin piano wire about ⅛" apart. The wire should then be soldered along the dotted line before the caps are soldered in place.

The air "shut off" from the tank is made from a gas cock. The excess parts are filed away to lighten up as shown.

The bicycle valve is next soldered into the other cap, after which holes are drilled and a 1/16" steel axle soldered in place as shown in the sketch at the right.

The tank should be tested for leaks by blowing up to about 40 pounds pressure and placing in a tub of water.

When sure that tank is O. K., solder the intake into the air cock as shown.

The general arrangement of the motor and tank assembly is shown at the right bottom of the cut.

The tank should be painted a dull black for effect.

The tank should be blown up by the use of a large foot pump, such as automobilists carry, to a pressure of about 150 pounds. The will take about one hundred strokes of an ordinary 1¼-inch diameter pump. A tire gauge will be needed to determine the proper pressure as it is dangerous to put more than 150 pounds in the tank. The engine should be run under pressure a few times to work it in, keeping it well oiled up. A small fly-wheel can be put in place of the propeller for this preliminary test.

The construction of the model is such as to provide a support for the motor and tank and also to hold the wings and landing chassis. The engine is fastened to the end of the frame members by the use of two strips of brass bent around the cylinders and fastened with thread and glue.

The tank is fastened by drilling holes in the frame and by inserting the ends of the bolts projecting from the side of the tank and the nut fastened on. This makes the frame stronger and keeps it from twisting out of shape, at the same time being the neatest way to fasten in place.

The front landing chassis is made up from umbrella ribs. Where the ends are fastened to the frame the rib is heated red hot and when cool flattened out with a few strokes of a hammer and fastened with thread and glue.

The wheels are of cork or wood 2" in diameter. The tail skid is made up of steel wire as shown and is fastened as before.

The rear wheel can be smaller in diameter and is also cork or wood. The wings should be made as light as possible and are built up of bamboo strips and dowel stick 3/16" in diameter. They are of the single surface type, the silk being fastened with glue to the top surface and doped.

The main spars of the wing should be planed to a half round section. The bamboo strips being fastened to the flat side of the spars. The trailing edge of the wings is formed by stretching strong linen thread from rib to rib as tight as possible. When the silk is fastened in place it will form what is known as a feathered edge and is very efficient.

The main planes have a total spread of 54" x 8", chord elevator is 18" x 4". When constructing the elevator the centre rib runs to the rear spar only to allow the plane to set at an angle of incidence to the line of flight.

The pylon or brace over the main planes is made of thin steel wire and fastened at the point shown in the drawings. When ready to fly the model be sure it is balanced properly. It is better to set the entering edge of the plane about 3" back of the centre of gravity. The elevator can be moved back or forth according to the glide.

It is better to start the model from the ground rather than from the hand, as it is almost impossible to spin the propeller, turn on the air and throw the model at the same time without a chance of mishap.

The model builder can construct a sort of a trigger arrangement for turning on the air, such as an arm soldered to the air "shut off" and a spring fastened to the tending to hold the valve open, to close a sort of dog is fastened to hold the valve closed and when pressed by the finger it moves away, allowing the arm to swing back to the open position.

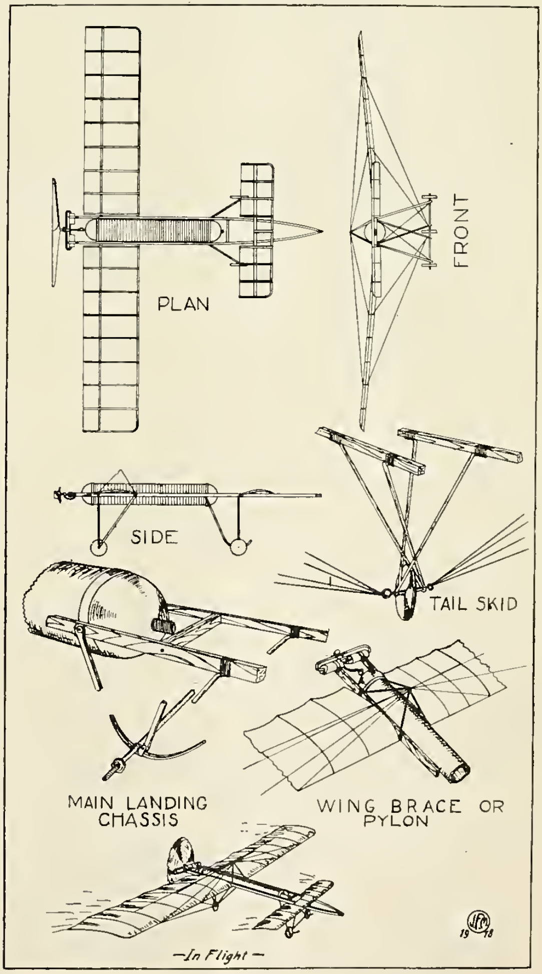
I might call attention to the size of the propeller. This should be from 12 to 16" in diameter, the proper size can be determined by experiment.

The landing chassis must be made long enough to hold the model properly the correct distance from the ground to keep the propeller from striking when getting off.

Flights of compressed air models vary. Some engines I have made showed no leakage of air and the model would not fly as well as when the leaking of the air could be heard distinctly. Of course, I do not say that the engine that leaks is the best, but I do believe that if the model builder is unfortunate enough not to make his apparatus air tight he can still get some reward for his work.

Some pretty scale models can be made powered with a compressed air motor. The famous Continental Aircraft Companies' pusher is very well suited for this purpose. The tank, which must be made shorter and larger in diameter, takes the place of the body and resembles it a great deal. Drawings of the Continental machine appeared in a previous issue of AERIAL AGE.

(To be continued)



Aeronitis

Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

The Barracks Aviator

By Jim

(With Apologies to Rumyard Tipling)

I've taken my work where I've found it;
  I've roved and I've roamed in my time;
I'v had my pick of positions,
  And three o' the lot—they was prime.
One was with pick and with shovel;
  One on a soft, easy chair;
The third was to ride, like a devil, astride
  O' a ship into space through the air.

Now I ain't no hand at hard labor,
  And sittin' still isn't my game.
The first is too hard on the back-bone;
  The second too hard on the brain.
There's things that you know that you might do,
  And some that you guess that you might;
But what you can learn from the H and the Dep
  Will help you a lot in a fight.

I was a wild young beginner,
  Stepped with the best on the ground,
Strutted in helmet and goggles,
  Swellest that ever was found.
Up in the air like a rocket,
  Back down I came like a stone;
Oh, the air it was blue, when the tutor came to,
  And found I had ne'er broke a bone.

The first time I went up for solo,
  I stood all alone in midair;
The earth down below me was rolling,
  And acting most awfully queer.
My stomach in unison mocked it,
  A queer lump rose up in my throat.
Says I to myself, "If I ever get down,
  I'll work on the ground when I'm broke."

I went for a ride on cross country,
  The day was quite clear and dead calm.
The ship floated on quite an angle,
  Then suddenly dropped like a bomb.
First she fell into a tail spin,
  Then came out of it flat on her back.
Perhaps you have seen Baird and Salmon,
  They're Aces—I'm only a Jack.

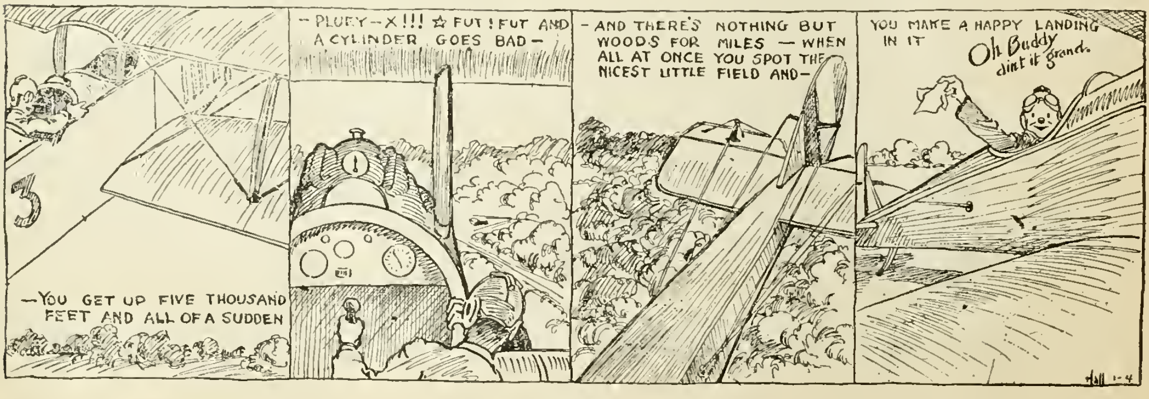
The vision I had when I hung there,
  On life belt, with head hanging down,
Was not a nice thing to remember,
  So I'll just pass it by with a frown.
Miss Phoebe, of Tale Spins, stood weeping,
And Marge, in her languishing way,
  Said, "Kid, here's your lid, come on now let's skid.
  For Marshall is due back today."

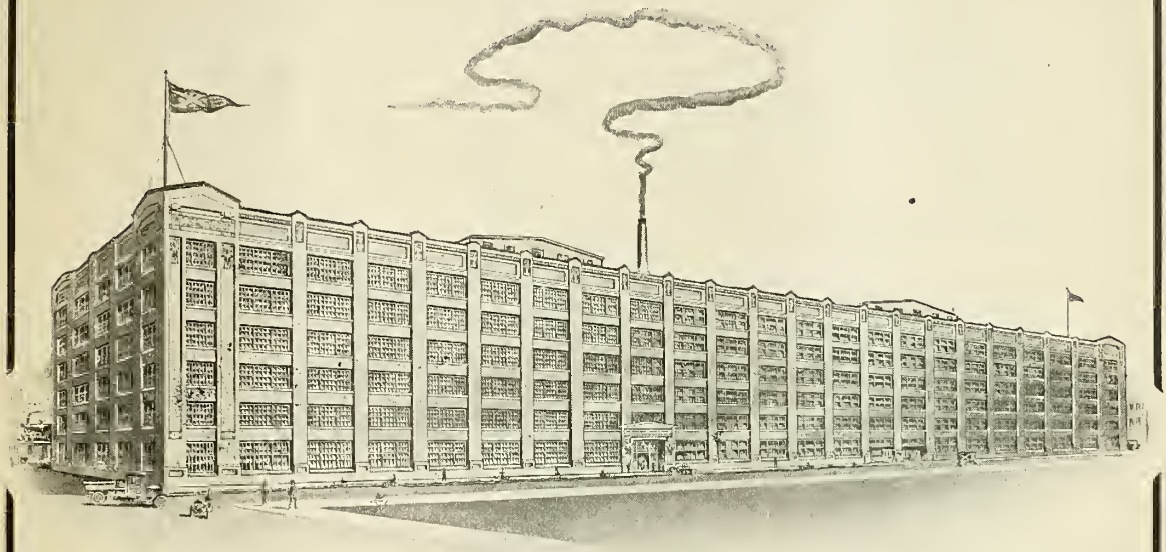
With a comical flip of her rudder,
  The ship straightened out and sailed home.
I was met by a man in a side car,
  With a heart that was built out o' stone.
He told me in old-fashioned English,
  The things that I never should try;
But I was so sick, his advice wouldn't stick,
  I thought that I surely would die.

I've taken my work where I've found it;
  My work and pleasure were one;
But now that I'm here in the army,
  I work like a son-of-a-gun.
It's better than pick and the shovel,
  It beats that old, soft, easy chair;
For my Uncle, I ride, like a devil astride
  O' a ship, into space, through air.

June

OH, June,
You month
Of War Brides
And Vacations
And Peek-a-boo waists,
Transparent hosiery
And Swimmin'
With Wimmin,
Hay Fever and
Nice, cool
Rin Gickies—
Oh, Damn the Kaiser.
And Then
The Average man imagines
That
There are only
Ten Commandments
Until
He gets Married.


3
—YOU GET UP FIVE THOUSAND FEET AND ALL OF A SUDDEN
—PLUEY—X!!! ☆ FUT! FUT AND A CYLINDER GOES BAD—
—AND THERE'S NOTHING BUT WOODS FOR MILES —WHEN ALL AT ONCE YOU SPOT THE NICEST LITTLE FIELD AND—
YOU MAKE A HAPPY LANDING IN IT
Oh Buddy dint it grand.



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Member Manufacturers' Aircraft Association, Inc.

(Continued from page 1328)

Lill, Arthur Carl	SLA; GLC
Lederer, Lewis G	DMA
Lamborn, Charles W	SLA; DMA
Lyon, Charles Edward	FLA
Lester, Hodge	WFO
Logan, David M	SMM
Lippman, Joseph Leonard	SLA; LDT
Lamond, James J	DIK
Leddy, Edward F	DIK
Likly, Henry Kenneth	SLA; CGC
Lahey, William Patrick	SLA; AAD
Lawrence, Henry D	FRF
Lawson, Dudley B	LDT
Lindsay, Charles Edward	SLA; CFT
Lawson, Norman	CAF; WIM; Note 1
Lawrence, Almon R	FRF
Levy, Saul	SLA; Note 18
Lee, Everett Samuel	SLA; UIU
La Parle, Walter Enders	SLA; DAF
Levick, John Newton	SLA; PMT
Ludwick, Frank M	Note 5
Lindsley, Dan L	TFT
Liggett, Arthur G	EOT

M

Merkle, Chris A	DIK
Middelton, Ellis S	DIK
Micander, Herbert C	DIK
Mott, Louis C	DIK
Moss, Fulton C	DIK
Murnen, George J	DIK
Mezley, Warren M	WFO
Montgomery, Robert C	WFO
Meyer, Charles L	WFO
Miller, Euclid D	SMM
Mitchell, Parker	FLA; ASM
Moon, George M	BST
Mann, Adolph Harless	SLA; CAF
Metcalf, William Henry	SLA; CAF
Mason, Chauncey C	PFO
Morley, John E	MJA
Myers, Ray Gregson	SLA; CRI
Merkle, Chris Arnold	SLA; CAF
Meyer, Philip	PFO
Moniger, Arthur V	FRF
Monticue, Verne Martin	SLA; HHN
Mayo, Robert C., Jr	SMM
Myers, George Gernest	SLA; EOT
Maurer, Paul Gard	SLA; WFO
Moser, William Charles	SLA; WFO
Miller, Reuben, Jr	MJA
Mahan, William J	FRF
Mackie, Robert F	FRF
Merkel, Louis J	WFO
Martin, James C	FRF
Megahan, Donald B	FRF
Miller, Galen	LDT
Moon, Charles M	DMA
Merrill, Patterson D	Note 19
Moore, James M	CFT
Melican, George D	FRF
Mahoney, Frank H	FRF
Moore, John M	DAF
Monroe, Harry H	DMA
Marks, James Christopher	FLA
Miller, James Carlyle	SLA; EOT
Murray, James Burch	SLA; DAP
Mosier, Orval McKinley	SLA; RSD
Monroe, Harry H	DMA
Miller, Daniel W	TFT
Moore, Walter M	TFT
Myers, George I	SLA; AAD
Myers, Devereux M	DMA
Moulds, Millard H	Note 3
Merriken, Wilbert Lacy	SLA; CJW
Marshall, John Humphreys, Jr	SLA; MAC
Marshall, Furber I	ASM
Munn, William T	SMM
Marsh, Ralph A	TFT
Morris, Thomas K	SMM
Mayer, Herbert C	WFO
Meyer, Frederick H	TFT
Miller, Max B	WFO

Mc

McCullough, Howard John	SLA; DAF
McKee, Ralph Spencer	SLA; DAF
McGaffigan, Bernard Aloysius	SLA; KST
McPike, George Vardeman	SLA; HHN
McClure, Paul Herbert	SLA; CFT
McAlister, Thomas Earl	SLA; WFO
McCollough, Max L	FRF
McDonald, John Quincy	SLA; EOT
McKinnon, Morton Howard	SLA: RSD
McKeever, James L	LDT
McIntosh, Henry Payne, Jr	CPA; VBW
McVey, Richard K	SLA; RSD
McGeary, John E	ELA
McClure, Colin B	LDT
McKernon, George E	LDT
McMahon, James Edward	SLA; GLC
MacDonald, Neil C	DMA
McNamara, John Francis	SLA; KST
McMillan, James Errol	SLA; GLC
MacMechan, Dunbar	EOT

N

Nusser, Adolph Ferdinand	SLA; KST
Nash, DeLloyd D	SMM
Nelson, Francis O	WFO
Nussle, Frank Etienne	SLA; PMT
Newell, John Robinson	SLA; KST
Nichols, Charles Rodney	SLA; WFO
Nicholson, George Mason	SLA; WFO
Noel, Olen W	FLA; KST
Nagle, Clarence D	FRF
Nasief, Benjamin John	SLA; WFO
Noyes, George Franklin	SLA; DAF
Nienhauser, Ralph Phillip	SLA; MAC

O

O'Brien, Thomas Francis	SLA; CAF
Olds, Fred Hartman	SLA; HHN
Overton, Robert E. L	SMM
Oaks, Harry C	LDT
Owens, Michael F	CGC
Overstreet, Thomas Jefferson	SLA; WFO
Obendorf, Walter J	SLA; DAP
Opel, Selmar Taylor	SLA; EOT

P

Pearson, Clarence W	SLA; AAD
Price, Edward F	DIK
Pierson, Karl D	SLA; EOT
Pollard, Alfred Leon	SLA; EOT
Page, Henry L	FLA
Poorman, Robert Boyd	SLA; CAF
Peake, Junius B	SMM
Powell, James F	SMM
Pierce, Lester W	PFO
Porterfield, Allen Wilson	FLA
Pierson, Earl Leslie	SLA; CRI
Pratt, Herbert Gordon	SLA; PMT
Parsell, Charles C	DMA
Perkins, Edward Adolphus	SLA; HHN
Pyle, Albert F	RSD
Perkins, Erwin Fontaine	SLA; UCB
Plummer, Harold Omar	SLA; EOT
Pinckney, Dunbar W	LDT
Perkins, Fred Joseph	SLA; WFO
Phipps, John S	MJA
Page, John H	FRF
Parker, Herbert W	FRF
Parish, William L	FRF
Paulson, Carl F	WFO
Peterson, Vance C	WFO
Parr, Elza W	SMM
Pearson, Arthur M	SMM
Pharr, Query	SMM
Powell, Orlo Allen	SLA; CAF
Poore, Owen Pierce	SLA; EOT
Polk, Claude Albert	SLA; EOT
Patrick, Albert Iverson	SLA; SBI
Purdy, Harold Sifton	SLA; HHN
Pearson, Alexander, Jr	SLA; RSD
Porter, Victor W	TFT
Perry, Gerald Leo	SLA; GLC
Pross, Edwin C	Note 25
Pearson, James Arthur, Jr	FLA
Patton, Edward J	Note 7
Porter, Louis H	BFT

(Continued on page 1338)

Organized College Research

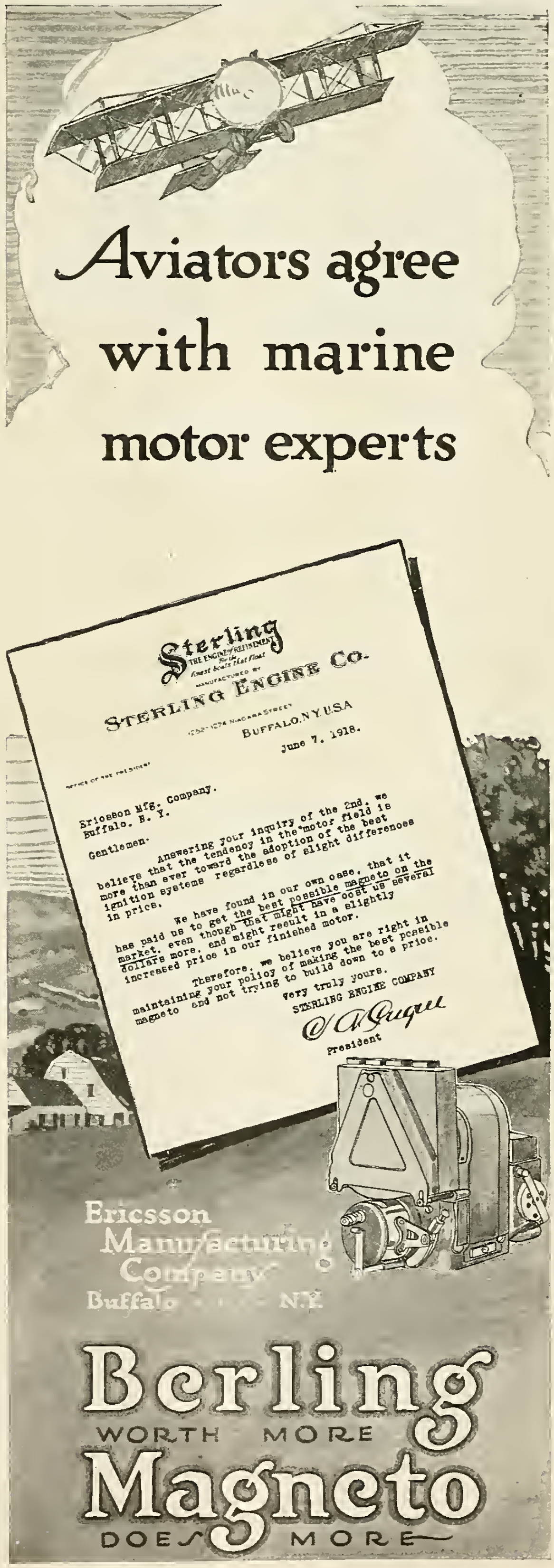
THE House Committee on Education has recently given a hearing on House Bill No. 9686, known as the Smith-Howard Bill, which proposes to establish engineering experiment stations in the states and territories and the District of Columbia in connection with state-supported universities or engineering schools for the promotion of engineering and industrial research as a measure of industrial, military, and naval preparedness in times of peace or war. A large volume of the most enthusiastic endorsements was presented at the hearing, and it is expected that the Committee will shortly report the bill favorably to the House.

This legislation will fill a long felt need in America. It is considered a war measure of first magnitude because it will immediately establish the greatest organization of research and experimental facilities in the world. The best equipped technical school in each State is to be selected as the location of the proposed state Engineering Experiment Station. $15,000 per annum is appropriated to each state to establish this work. As was the case with the Agricultural Experiment Stations, it is expected that each state will appropriate an amount equal to that provided by the Federal Government. In many instances states have appropriated two or three times as much money for the agricultural experiment stations as is regularly appropriated by the government; and since the great productive value of the proposed stations will quickly become obvious, the stations will undoubtedly be provided with reasonably ample appropriations.

The same bill was introducted at the last session of Congress. Appreciating the tremendous possibilities of such a system of organized research, the officials of the Aero Club of America recommended that researches in aeronautics and aero-dynamics be included in the provisions of the bill. In the new draft of the bill, Mr. Phinehas V. Stephens, the author, has accepted these suggestions, and the board of governors of the Aero Club of America recently passed a resolution giving their unanimous endorsement of this legislation.

The Bill provides $25,000 annually in addition to that given to the colleges, to the Secretary of Commerce, who is to establish in the Bureau of Standards a department of college research for extending as far as practicable the facilities of the Bureau of Standards to those engaged in the work of the

Mr. S. S. Jerwan, veteran American aviator, who has been chief instructor of Guatemalan Air Service for the past four years. The photograph, reproduced herewith by courtesy of Mr. Charles Jerome Edwards, shows some of the trophies Mr. Jerwan has won in Guatemala



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AERIAL AGE WEEKLY

(*Continued from preceding page*)

proposed experiment stations. The Department of Commerce will have general supervision of all of the stations, which supervision is intended to secure uniformity of methods, efficiency and the most economical expenditure of funds, by avoiding as far as possible useless duplication and by making available to each station the results of the work of other stations and that of the Bureau of Standards.

As a war measure this will bring into the use of the Federal Government more than $50,000,000 worth of the best scientific and research laboratories of the country, and this should constitute a very important stimulus to invention and research relating to our military air program and also the utilization of flying machines for commercial and social purposes after the war. The art of flying and the construction of aircraft is in its infancy. The establishing of these engineering experiment stations in each state will invite the inventive genius of the youth of America. It will also encourage such work by the members of the faculties of these engineering schools who are, as a rule, experienced in research and experimental work, but are without the financial support necessary for exhaustive research.

There will also be provided the opportunities for the manufacturers in each state to readily secure the solution of the multitude of problems that confront them in their various manufacturing processes. Each state has more or less natural resources now needing development, and these stations will serve the industrial development of the states in the same way that the agricultural experiment stations have helped to make America the greatest agricultural nation in the world.

Advanced List of Men and Colleges Agreeing to Cooperate in Securing the Passage of the Smith-Howard Bill

Dr. Jacob G. Schurman, Pres., Cornell University, New York.
Dr. E. E. Haskell, Dean, Cornell University, New York.
Dr. Richard McLauren, Pres., Massachusetts Institute of Technology, Mass.
Dr. Edmund J. James, Pres., University of Ill.
Dr. Edgar F. Smith, Provost, University of Pennsylvania, Pa.
Dr. K. G. Matheson, Pres., Georgia School of Technology, Ga.
Dr. W. R. Whitney, Director, Research Lab., General Electric Co., and member, Naval Consulting Board, N. Y.
Dr. W. F. Durand, Chairman, National Advisory Committee for Aeronautics.
Mr. Henry A. Wise Wood, Vice-Pres., Aero Club of America, New York.
Mr. Henry Woodhouse, Editor and Publisher, *Flying* and Aerial Age.
Dr. G. M. Butler, Dean, College of Engineering, University of Arizona.
Dr. Guy Potter Benton, Pres., University of Vermont.
Dr. Melvin A. Brannon, Pres., University of Idaho.
Dr. Irving Fisher, Yale University, Conn.
Dr. H. A. Bumsted, Sloane Laboratory, Yale University, Conn.
Dr. Joseph F. Merrill, Director, School of Mines and Eng., University of Utah.
Dr. Harold S. Boardman, Dean, College of Eng., University of Maine.
Dr. Frank L. McVey, Pres., University of Kentucky.
Dr. Frank J. Goodman, Pres., Johns Hopkins University, Maryland.
Dr. Robert Sharp, Pres., Tulane University, Louisiana.
Dr. Victor C. Alderson, Pres., Colorado School of Mines, Colorado.
Dr. J. R. Benton, Dean, College of Engineering, University of Florida.
Mr. George J. Baldwin, Vice-Pres., American International Corp., N. Y.
Dr. William McClellan, Director, Inter. Collegiate Intelligence Bureau, University of Penna.
Dr. Harold Pender, Board of Managers, Am. Inst. of Electrical Engrs.
Mr. W. H. Wiley, Pres., John Wiley & Sons, Scientific Publishers.
Dr. A. W. Brown, Prof. of Chemistry, Cornell University, New York.
Dr. Adelbert P. Mills, Prof. of Materials and Testing Lab., Cornell University.
Dr. Geo. P. Pegram, Dean, School of Mines, Eng. & Chemistry, Columbia University.
Prof. Henry S. Jacoby, Cornell University.
Dr. Charles E. Locke, Massachusetts Inst. of Technology, Mass.
Dr. W. L. Burton, Pres., University of Minnesota.
Dr. Samuel Avery, Pres., University of Nebraska.
Dr. E. E. Sparks, Pres., Pennsylvania State College.
Prof. R. L. Sackett, Dean, College of Eng., Penn. State College.
Dr. E. C. Persio, Pres., South Dakota State College.

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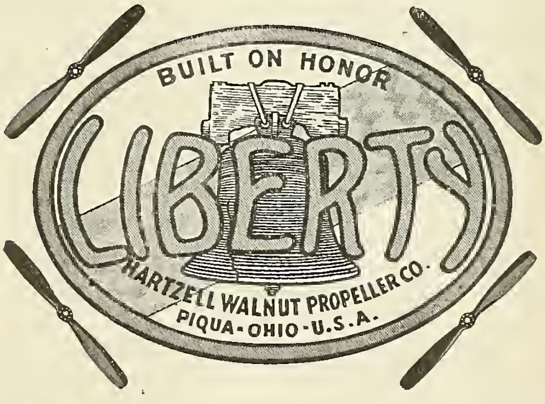
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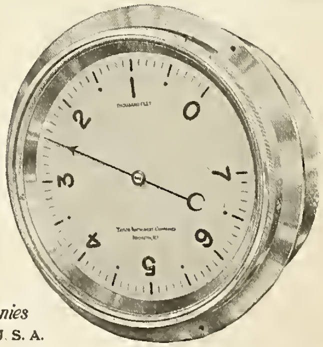

(Continued from page 1334)

R

Ratcliffe, Kent E.........................EOT
Reavis, Carlos L.........................EOT
Rohm, Homer..................SLA; CGC
Rose, James A..................SLA; VBW
Raque, Carl Philip..................SLA; PMT
Reed, Paul Spencer..................SLA; EOT
Ruggles, Francis W.........................MAT
Russell, Everett P.........................FOB
Reese, John Calvin..................SLA; CGC
Robinson, Fernando Albert..........SLA; TFT
Rierson, Thomas P.........................DAF
Redding, Robert D.........................DAF
Ralston, William H.........................LDT
Runkle, Charles G.........................LDT
Roche, Walter J.........................LDT
Reichert, Edward T.........................RSD
Reed, John H.........................WFO
Read, Joseph Frederick..............SLA; CAF
Rice, Frank G.........................APR
Reid, Herbert Wesley..................SLA; FOB
Rennebaum, Ernest H.........................LDT
Russell, Clinton W.........................DMA
Richards, John A.........................FRF
Reading, Clyde W.........................FRF
Robertson, William M.........................FRF
Reitmann, Henry Dietrich..........SLA; CFT
Reicks, Frank C.........................TFT
Rowe, McClendon Gladstone........SLA; GLC
Ryan, John H.........................DMA
Rowley, Enos Jennings..............SLA; CAF
Renfro, De Grimm.........................DAP
Rowley, George Irving, Jr..........CPA; DAP
Rooney, Albert W.........................BFT
Rinker, Harry Monroe..............SLA; CFT
Robins, Edward John..................SLA; RSD
Robertson, Hugh Biron..............SLA; VBW
Ragatz, Edward G.........................TFT
Robins, Augustine W.........................JMA
Reyburn, William Stuart.........................CPA

S

Singleton, John D.........................DIK
Skerratt, John W.........................DIK
Stauyer, Frank L.........................DIK
Staerker, Otto.........................DIK
Spiers, Robert H.........................DIK
Stevens, Henry Harmon.........................FLA
Smith, William H.........................DIK
Smith, Paul S.........................DIK
Steller, Adolph W.........................DIK
Sneed, Albert L...........LDT; WDM; Note 1
Schmidt, Herbert Walter...........SLA; WFO
Schlaich, Frederick W.........................PFO
Shattuck, Ray A.........................PFO
Stone, Alonzo E.........................PFO
Speck, Frank Caspar, Jr............SLA; PMT
Smith, Vernon Virgil..................SLA; CRI
Stevens, Clifford C.........................PUP
Simons, John W., Jr.........................LHV
Stetson, John Minor..................SLA; DAP
Strauss, Sidney Harold..............SLA; CRI
Stuckey, Arthur Ray..................SLA; LDT
Scott, Allison Fendall Hannay.............CPR
Scott, Stanley Hough..................SLA; HHN
Safro, Victor Irving..................SLA; CGC
Salisbury, Earle Edwin..............SLA; CRI
Smith, Clyde H.........................EOT
Strickland, Chauncty J.........................ADT
Sale, William E.........................SMM
Sauter, Raymond J.........................BST
Sweeney, David Robert..............SLA; DAF
Stanton, Arthur Heath..............SLA; KST
Sedgwick, Alfred..................SLA; EOT
Seitner, Harvey..................SLA; CGC
Schary, Harry A.........................FRF
Sexton, Charles S.........................FRF
Stein, Carroll V.........................ASM
Smith, Dean C.........................ELA
Smith, Wesley Lott..................SLA; WFO
Spencer, William Warren.........................FLA
Sebree, George McClellan..........SLA; HHN
Seabury, William W.........................PUP
Spence, Dewitt T..................SLA; VBW
Spannagle, Guy Edward..............SLA; TFT
Scott, Elmo Carlyle..................SLA; KST
Steele, Richard W.........................FRF
Schofield, Aubrey W.........................FRF
Stumpf, Charles B.........................LDT
Schreeder, Goodson..................SLA; VBW
Sullivan, Thomas L.........................LDT
Starrs, Joseph V.........................TMA
Scofield, Edward E.........................WFO
Schafer, Alfred G.........................WFO
Splane, Alvin William..............SLA; WFO
Sharpe, Karl E.........................EOT
Schroeder, John A.........................WFO
Scott, William, Jr.........................CAF
Smith, Raymond W.........................CFT
Scobey, Reuben B.........................TFT
Swinson, Casper D.........................TFT
Steele, Austin Bristol..............SLA; KST
Swift, Artbur Dean..................SLA; AAD
Slye, Ernest Cecil..................SLA; CWT
Sibbald, Bruce F.........................SMM
Stevenson, Raymond V.........................SMM
Stevick, Guy L.........................SMM
Seabury, Paul Richardson.......SLA; Note 14
Sharon, Leon Edgar..................SLA; EOT
Sealy, Neagle Podgere..............SLA; VBW
Shafer, Alfred George..............SLA; MAC
Shrader, Myron Rupert..............SLA; MAC
Stover, Allen Roswell..............FLA; DAP
Smith, Wallace Gordon..............SLA; CWT
Smits, Larry Ame..................SLA; CWT
Shield, Lansing Peter..............SLA; CWT
Shaw, Donovan L.........................HHN
Selberg, Arthur E.........................EOT
Smith, Harold A.........................EOT
Sullivan, Charles W.........................EOT
Schuman, Fred Williams..............SLA; MAC
Silver, Bertram Eugene..............SLA; EOT
Sessions, Charles Carroll.........SLA; Note 12
Smith, Eugene Gardner..............SLA; WFO
Smith, Paul Sherman..................SLA; CAF
Swanson, William N...................Note 26

T

Tozer, George Austin..................SLA; DAF
Trusler, Harold Milton..............SLA; KST
Terry, George F.........................DIK
Tilbrook, Milton A.........................DIK
Thornton, Arthur L.........................DIK
Thweatt, William Kavanaugh, Jr....SLA; AAD
Thomas, John E.........................CUI
Truscott, Frederick W.........................FLA
Thiele, Carl Louis, Jr..............SLA; GLC
Thornton, Arthur Leslie..............SLA; CAF
Tower, Robert R.........................LDT
Teborek, Joseph E.........................LDT
Terry, George Franklin..............SLA; CAF
Tanner, Howell, Moffette..............SLA; CJW
Tait, Trevor Spottiswoode..............SLA; LDT
Thornton, Ernest G.........................FLA
Thalman, Charles H.........................UTA
Tutnall, Emmett R.........................DMA
Tilson, Howard F.........................DMA
Trickle, Ralph E.........................Note 6
Terry, Mead Meehan..................SLA; LDT
Tidd, Luzerne M.........................SMM
Tissot, Thomas P.........................SMM

U

Utley, Charles B.........................CWT

V

Vawter, David Dobyns..................SLA; CRI
Vail, Edgar Landon.........................CPA
Vrooman, Samuel B.........................DAP
Vernon, Charles C., Jr.........................LDT
Vines, John O.........................LDT
Volintine, Daniel..................SLA; CRI
Voelker, Frank F.........................FLA
Van Bibber, Ray Odin..............SLA; EOT
Veach, Thomas F.........................DMA
Vinson, Clyde..................SLA; EOT
Vickers, Edward William..............SLA; CWT

W

Wells, Volney Hunter..................SLA; DAP
Waterbury, Neil Marr..................SLA; PMT
Wilbur, Clifford Henry..............SLA; RSD
Waterman, Herbert William..........SLA; PMT
Windham, Jesse Madison..............SLA; PMT
Wrigley, Paul P.........................HHN
Widenham, John Maxwell..............SLA; DAF
Wagner, Ralph P.........................SMM
Wagoner, George A.........................EOT
Waite, Herbert E., Jr.........................LDT
Whitehouse, William Edwin..........SLA; LDT
Wilcox, Philip Wakeman..............CPA; DAP
Watson, Minor Shelton..............SLA; LDT
Wade, Alston Boyd..................SLA; EOT
Winters, Verne William..............SLA; UCB
Weed, Frederick B.........................FRF
Wells, Edward Pierce..................SLA; CFT
Wood, Benjamin F.........................LDT
Wohlgemuth, Bruno Edward..........SLA; PMT
Warner, Carmi Lewis..................SLA; LDT
Wales, William Chauncey..............SLA; LDT
Weiler, Raymond Lewis..............SLA; LDT
Wright, Charles Nelson..............SLA; WFO
Whitney, Richard Skinner..............SLA; RSD
Waltham, Ralph O.........................FRF
Williams, Glenn E.........................FRF
Wincote, Charles B.........................FRF
Wightman, Norman H.........................PWM
Wilson, Alexander H.........................WFO
Winsor, Frederick..................CPA; DMA
Wilson, Leroy Alonzo..................SLA; UIU
Witt, Joseph Bouldin..................SLA; DAF
Walker, Thacker V.........................Note 9
Wilde, Robert John..................SLA; LDT
White, James F.........................Note 11
Walker, Stephen P.........................CWT
Wrenn, Theodore W..................MJA; DMA
Woodard, Henry Guy..................SLA; EOT
Wilson, John L..................SLA; CGC
Wilson, Edward Everett..............SLA; CFT
Weisenborn, Stanton M.........................BFT
Wood, Ben Brown..................SLA; CJW
Wales, Edward V.........................MAT
Wilson, Clarence Chamberlain.......SLA; CWT
Wilcox, Clyde Edwin..................SLA; CWT
Whitely, Felix Elbert..................SLA; CWT
Wilkinson, John Sherfey..............SLA; RSD
Wolff, Herman D.........................SMM
Wood, Robert V.........................SMM
White, Oscar.........................EOT
Williams, Luther B.........................EOT
Woodard, James W.........................EOT
Woolson, Lionel M.........................FRF
Williamson, Cleburne M.........................TFT
Whitehouse, William E.........................BFT

Y

Young, Evan D.........................WFO
Yerkes, Lawrence A.........................LDT
Yoeman, Chauncey DeWitt..........SLA; LDT
Young, Carlton E.........................TFT

Z

Zeller, Max John..................SLA; LDT
Zollman, Martin W.........................LDT
Zacharias, Allen Howard..........MJA; Note 17
Zimmers, David Franklin..............SLA; TFT
Ziegler, John W.........................LDT

(Continued from page 1321)

Capt. Puckett is Field's Official Chaser of Flies

Capt. Carl Puckett, official "fly chaser" of the Kelly Field Flying Department, walked 303 miles during the month of July, trying to find a fly in the kitchens and mess halls of his "beat." His pedometer tells the tale.

Every day Capt. Puckett visits every kitchen and mess hall in the Flying Department, which means that he walks ten miles every day. If he saw a fly during the entire month, Capt. Puckett has no recollection of it now. The field is remarkably free from them, according to his statement.

This condition has been brought about by the constant warfare waged against flies by every mess sergeant, cook and "K. P." in the Flying Department, under Capt. Puckett's supervision. Traps and swatters are the weapons used in fighting flies, but eradication of breeding places has worked the worst hardship.

Capt. Puckett also serves as Herbert Hoover's right-hand man in the Flying Department. It is a part of his business to check up the food wastage and to see that it is reduced to the minimum. Through the hearty co-operation of mess sergeants and cooks and the men themselves, food waste is negligible, and could hardly be further reduced, Capt. Puckett says.

The Flying Department's "official fly chaser" is the second oldest man at Kelly Field in point of service at this camp. He is outranked only by Capt. S. R. Evans. He has been at Kelly Field eleven months and has been in the sanitary inspection department since February 1.

Capt. Puckett was a practicing physician in Pryor, Okla., for thirteen years before he came into the army. He was physician for the State Orphans' Asylum for seven years and County Superintendent of Health for three years.—*Kelly Field Eagle.*

Use Movies to Train Pilots in Gunnery

An American Aviation Training Camp in England.—The moving picture is being widely used in the training of American pilots in this country. The young flying officers who are sent to the armament school here to acquaint themselves with the use of aeroplane guns and gun-gears find their three-weeks course a most interesting one, owing partly to the large share which the moving picture machine plays in the instruction.

The pupil is not required to sit out a lengthy lecture read aloud from the notes of an instructor. Instead, the various branches of gunnery training, snch as the stripping and assembling of guns, and the various points to be observed before, during and after flight, are demonstrated by films, accompanied by concise explanations by competent officers.

Frequently a film is run over the screen several times at different speeds so that the pupil gets a very intimate idea of the process being illustrated. Monotony and complexity finds no place in this method of training.

The films standardize the correct methods, and their instructional value is far-reaching. The film work is not confined to gunnery alone, but is continued in the other technical courses, such as aerial tactics and bomb dropping. According to British instructors, the use of the film has shortened and improved the course of training in these departments very materially.—*The Fly Leaf.*

Open Camp John Wise Hospital September 1

The new field hospital at Camp John Wise was formally opened September 1 with appropriate ceremonies. The program included a concert by the new camp band and speeches by camp officers and leading citizens and physicians of San Antonio. The hospital is equipped with every known modern device and its erection was personally supervised by Capt. Phillip J. Lipsett, Post Surgeon. Four wards consisting of the general, surgical, isolation, and officers, compose the hospital. It also has a dental room with full equipment. It has a capacity of 60 patients.

Aircraft Board Needs Men

Washington—The Bureau of Aircraft Production has been authorized to make a limited number of voluntary inductions of men registered under the present draft. An urgent need exists for accountants and manufacturing cost clerks who have had either office or factory experience. Induction is open only to men in Class 1A, who are classified for limited service or who are in the remediable group, and to men placed in deferred classes on account of dependency.

The work to which applicants will be assigned is declared to be not only of great service to the Government in the production of aeroplanes, but it will prove of benefit as well to the individual in the training which he will receive. Applicants should communicate with the Personnel Officer, Finance Division, Bureau of Aircraft Production, 119 D Street, Washington, D. C.

Location of Forty Air Squadrons

Of the forty air squadrons, whose organization was recently authorized, four will be located at Houston, Texas, and thirty-six, or a training brigade of three wings, on Long Island, N. Y. The

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base of this Long Island training brigade, as now planned, will be Hazelhurst Field, near Mineola. The squadrons will be quartered in groups of four on nine outlying fields. These squadrons are to serve under field conditions, simulating as nearly as practicable the conditions behind the lines in France. They will train as organizations, and it is hoped to furnish them completely with personnel and equipment so that when they have finished their training in the brigade very little additonal training will be required before they take their places on the front. This will also enable them to be sent to Europe in complete squadrons instead of detachments as heretofore. The outlying fields on Long Island, which will be used for the new enlarged training operations, will be Brindley Field, at Commack; Lufbery Field, at Wantaugh; Mitchel Field, at Mineola, and Henry J. Damm Field, near Babylon. Five more will be occupied eventually.

New Army Balloon School

To complete the construction of the new balloon school at Lee Hall, Va., the allotment of $203,000 has been approved by the Assistant Secretary of War. This balloon school is for the training of officer observers in the control of artillery fire from observation balloons. Lee Hall will be a finishing school for Air Service officers in aerial observation and will co-operate with artillery stationed there. In this manner the officers will receive actual experience in artillery fire adjustments, directing the same from observation balloons in the air, just as they will do at the front. The completed plans for the new school include about sixty buildings, among them a balloon shed, aero repair shop, garage, firehouse, photo laboratory, as well as mess halls, barracks, school buildings, etc. The capacity of the school will be more than 1,000 men. Major Harry R. Vaughn is the commanding officer. It is expected that the buildings will be completed and that the school will be in full operation within two months. It is also announced that in order that the work of training men for heavy artillery may be developed as rapidly as possible and under the most favorable conditions, it has been decided to increase the size of Camp Abraham Eustis at Lee Hall at once. Orders have been issued to the Construction Division to proceed with the work. It is estimated that the additions will cost $1,940,000. The enlargement calls for motor transportation schools for 500 students, garages, repair shops, a short railroad, concrete roads, new ranges and barracks and quarters for one trench mortar battalion and one anti-aircraft battalion.

Naval Aviation at Dunwoody

Minneapolis, Minn.—Following close on the inspection of Dunwoody Naval Training Schools last month by Capt. Thomas J. Senn, U.S.N., Assistant Chief of Bureau of Navigation, came the request from Washington for Comdr. Warren J. Terhune, U.S.N., commandant, to submit a prospectus on facilities available in Minneapolis for expansion of the work in aviation. The result of this move is the authorization by the Navy Department of the third regular ground school for student flight officers. The two ground schools previously established are at Massachusetts Institute of Technology, Boston, and at University of Washington, Seattle.

Since last November, when Lieut. Colby Dodge, U.S.N., initiated student pilot training at Dunwoody, aviation activities in Minneapolis have swiftly matured. The second class of "near officers," rated CQM (A), depart for naval air stations on the east coast early next month, while the third quota (25 men), detailed to Minneapolis from outside points, arrives this week to begin training. The first two classes were all enrolled locally, and while many additional students will continue to be ordered here from elsewhere, it is hoped to obtain from the Twin City community further contingents of excellent material as soon as Navy recruiting re-opens.

According to the new schedule of ground school instruction recently issued by the Department the course is limited to eight weeks. For the present it is the intention to maintain the Dunwoody pilot classes to the strength of 100 men, four classes of twenty-five men each, and as the senior class is transferred East for flight training, what might be called the freshman class begins, while the other classes advance correspondingly. Ens. William Eastman, U.S.N.R.F., aviation officer, is now in Boston receiving further instructions for handling new men.

Dunwoody is reckoned particularly fortunate in having as instructors for the four principal ground school subjects (navigation, rigging, gunnery, motors) four former officers of the British Flying Corps, three of whom were naval aviators on duty in the North Sea and the other a member of the Royal Flying Corps at the front in France.

Field at Ellington Is Enlarged

Washington.—During the coming winter Ellington Field is to be one of the busiest aviation camps in the country. Plans to this end are now being worked out by the aviation branch of the signal corps.

The new draft act, which paves the way for the induction into the army of more than 2,000,000 men, means the increased use of all of the army camps and cantonments in the Southern States. It will be impossible to give the character of intensive training in the Northern camps which the army contemplates in order to have these new fighting forces ready for transportation to Europe in the early spring in readiness for the great drive that is to be made through the Hun lines in the expectation of bringing the world war to its closing stages in 1918. The Southern camps will be filled to their capacity and kept at that stage throughout the winter months in order that there may be no let up in the training of the men. Winter weather in the Northern camps will prevent this character of training.

Ellington Field has been reorganized into one of the big bombing fields of the country. The six new steel hangars now being erected there by troop labor are intended to afford added facilities to meet this new and extended field of operations at Ellington. These steel hangars will cost between $9,000 and $11,000 each and are to be completed with all possible speed. The 333 acres of land recently added to Ellington Field have been designated as the site for the bombing practice to be afforded the cadets. This new land added to the extensions at Park Place and San Leon makes Ellington Field one of the very largest in the country.

Cadets who are drilled in bombing work will be flyers who have passed through their preliminary training at other aviation fields and are then detailed to Ellington on their work.—*Houston Post.*

Finger Prints

In compliance with general orders from Washington the post surgeon at Ellington Field will take all the finger prints of the officers of the field. These records will be forwarded to Washington and placed on file, giving the department a means of positive identification.—*Talespins.*

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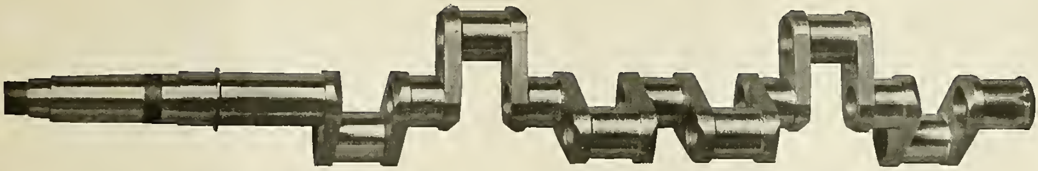

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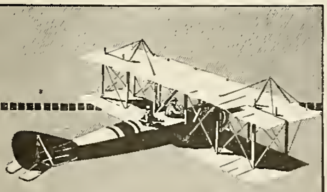

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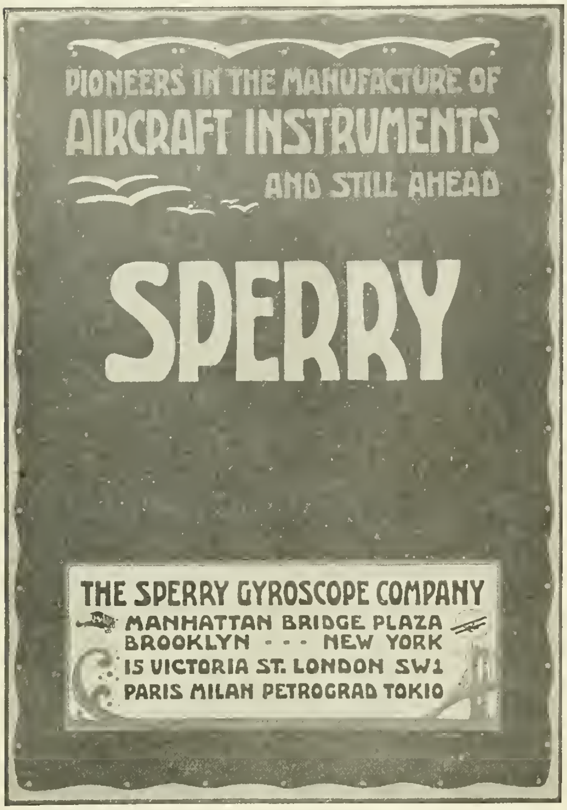
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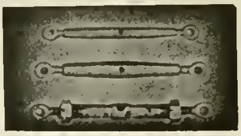

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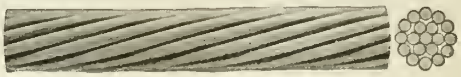

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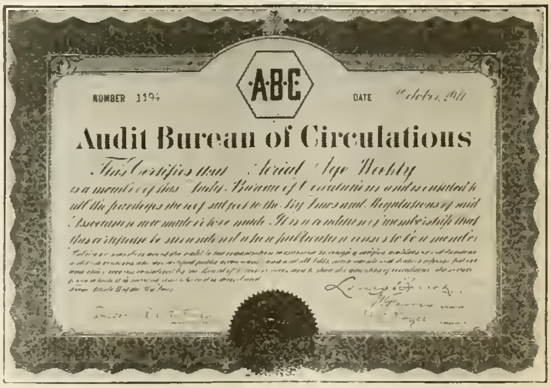

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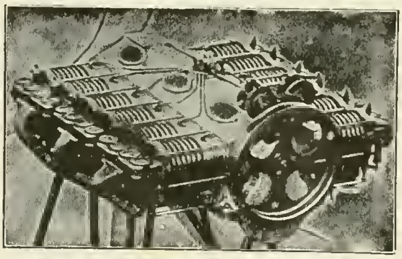

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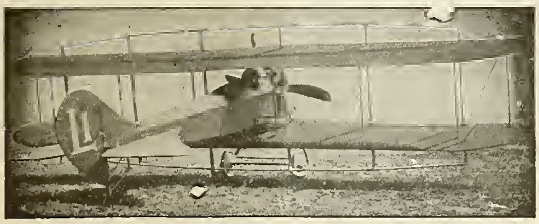

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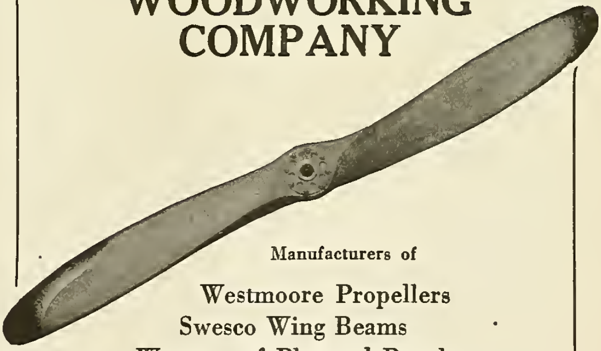

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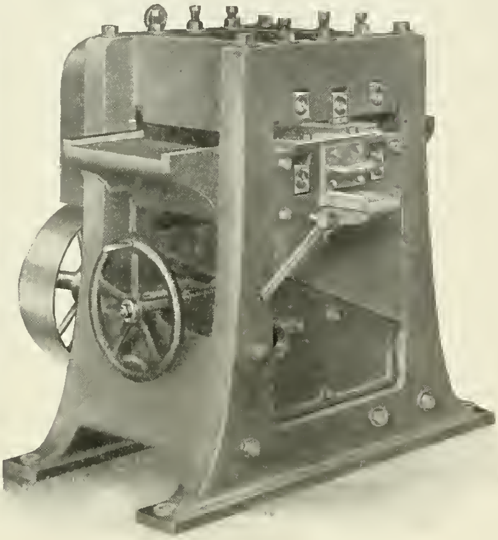

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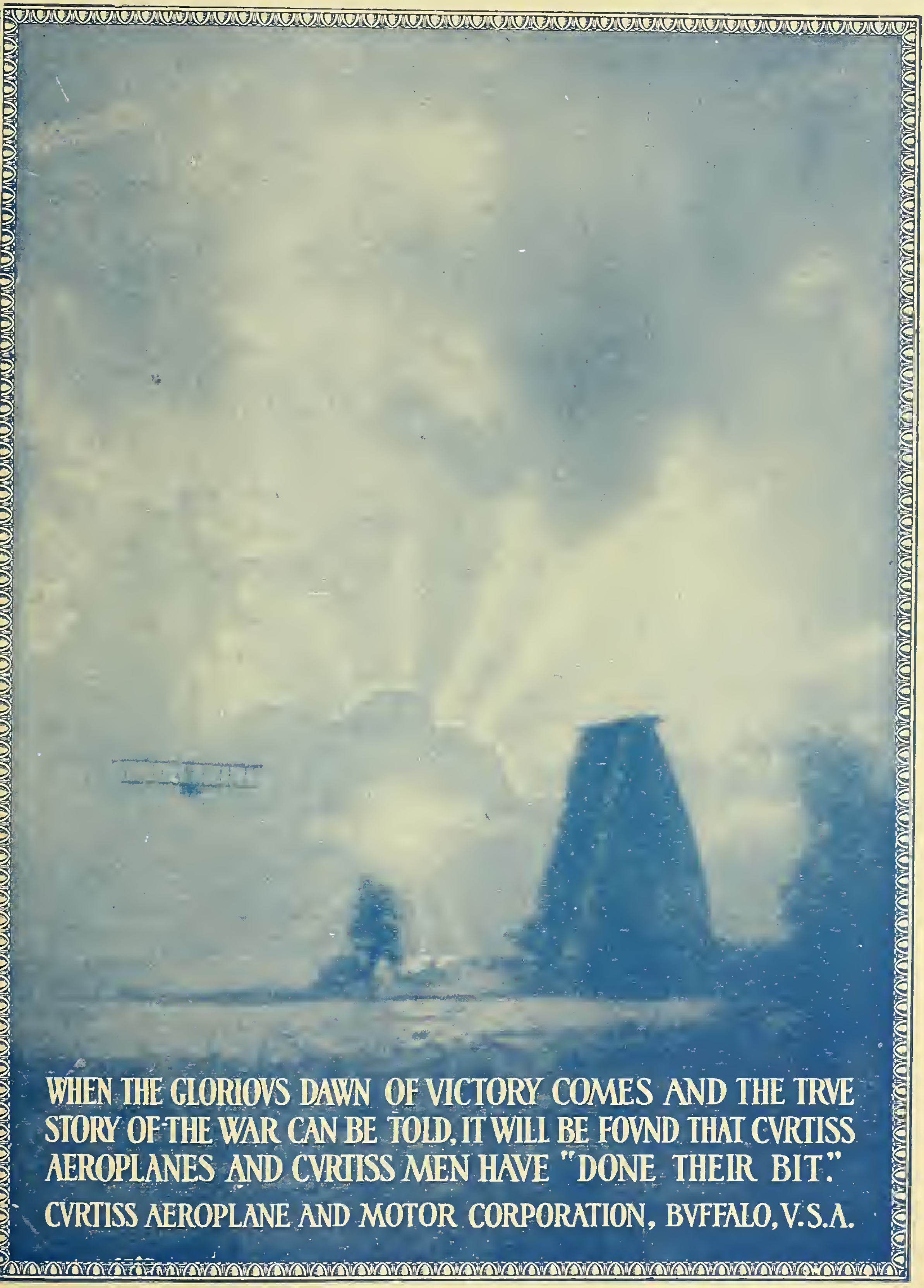
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AERIAL AGE WEEKLY

Vol. 8, No. 3 SEPTEMBER 30, 1918 10 CENTS A COPY

Dispatch Fleets of Liberty Planes

Allied Air Control Plainly Shown

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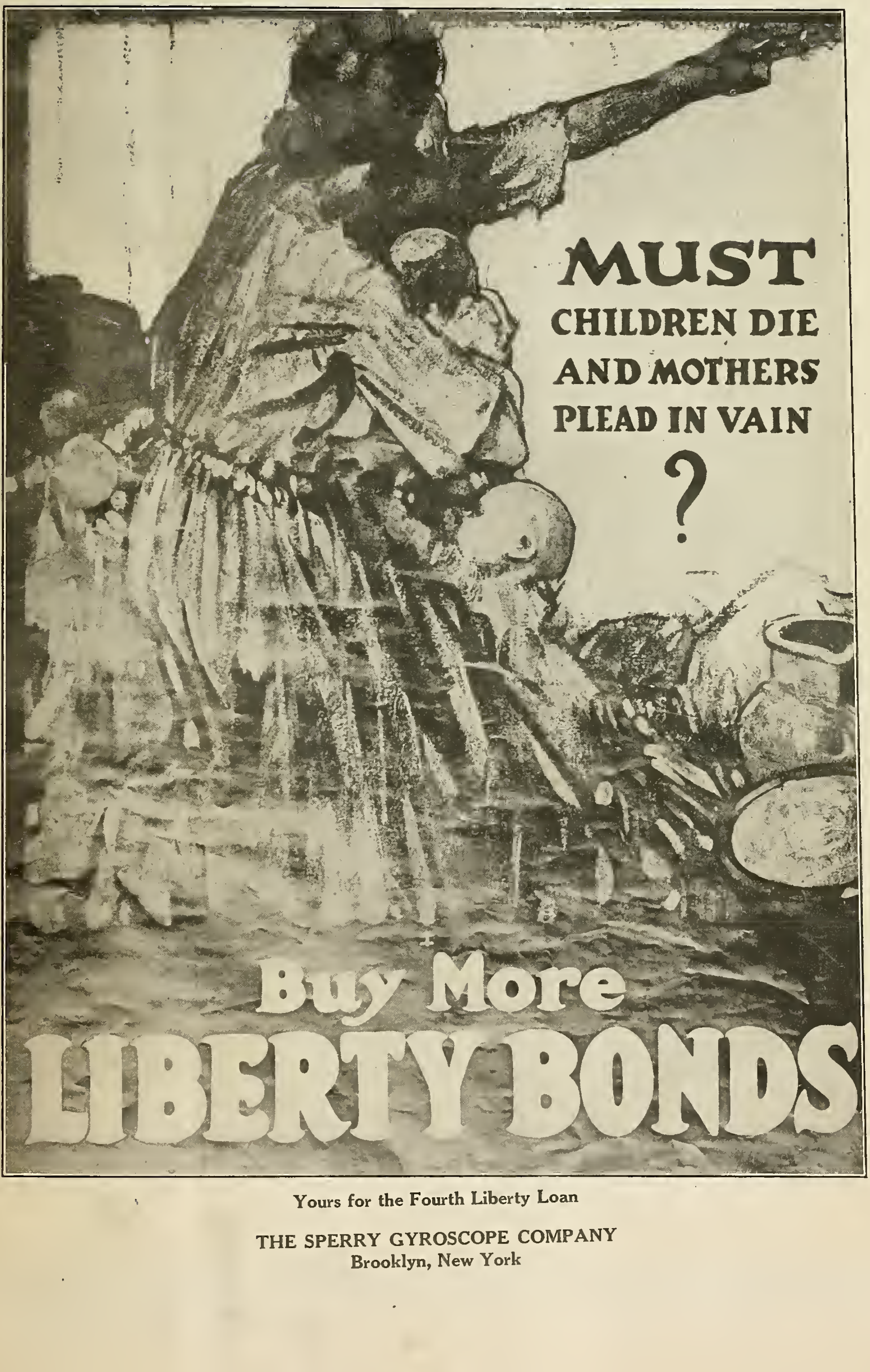

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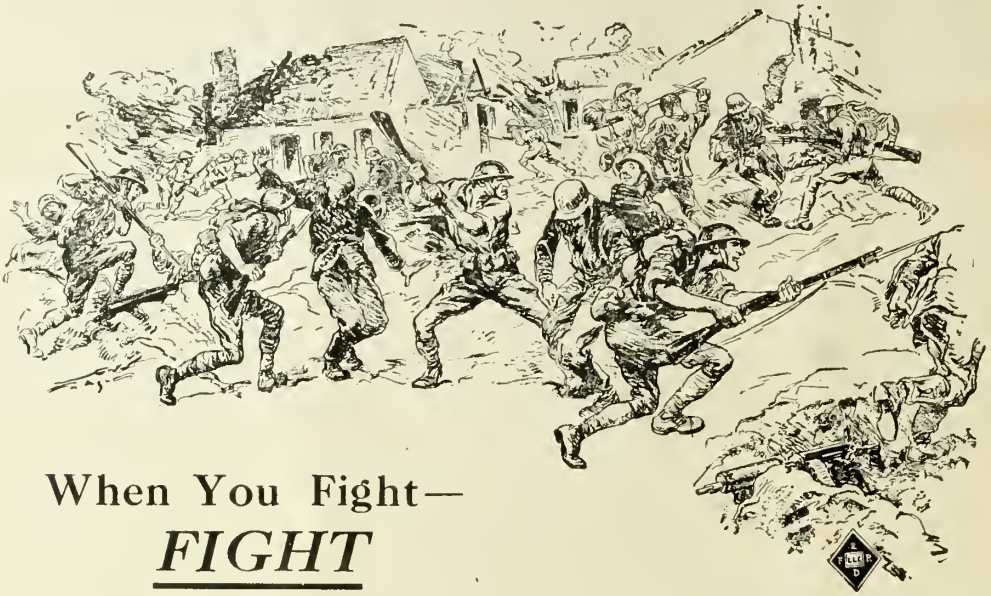

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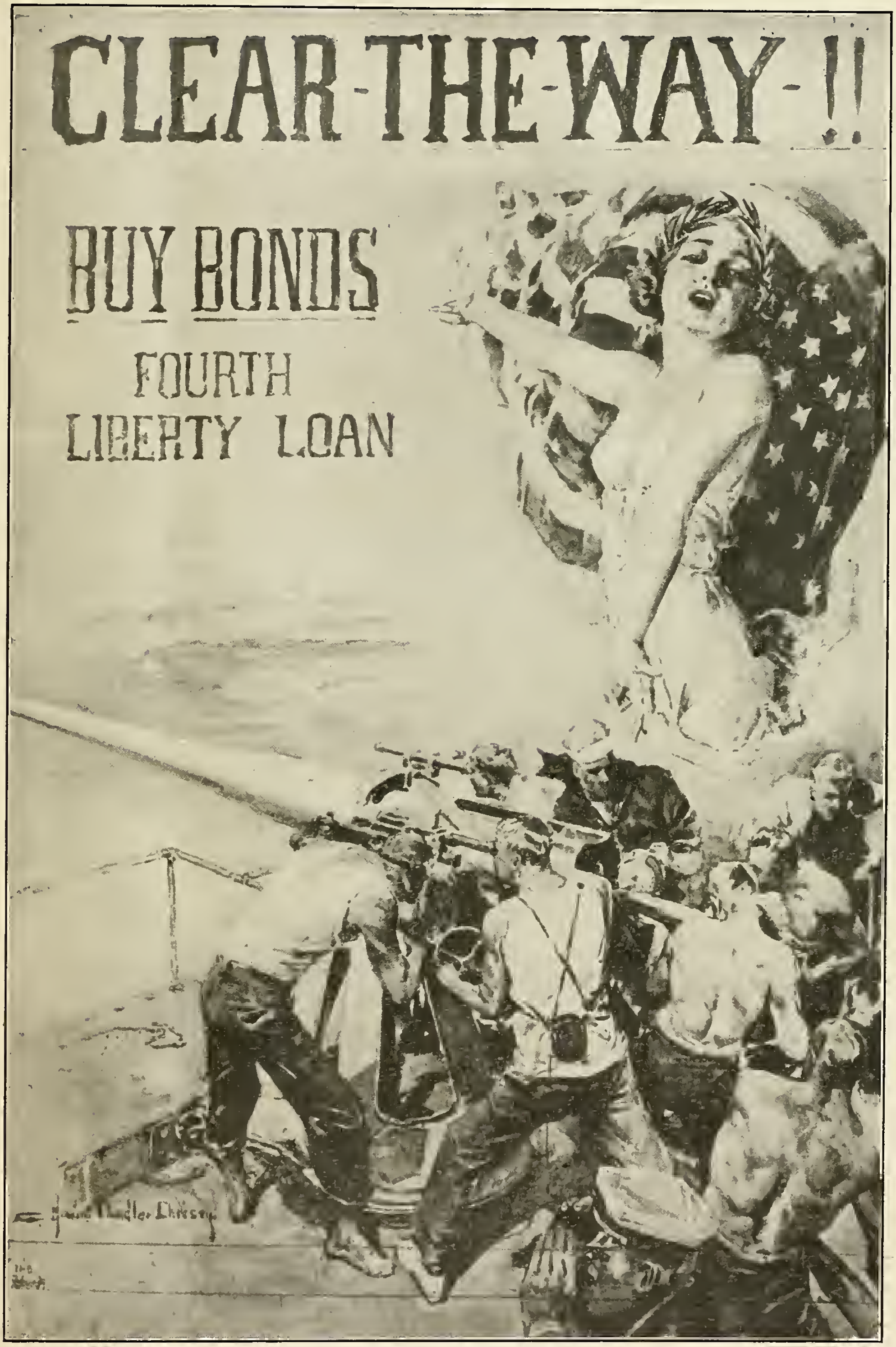

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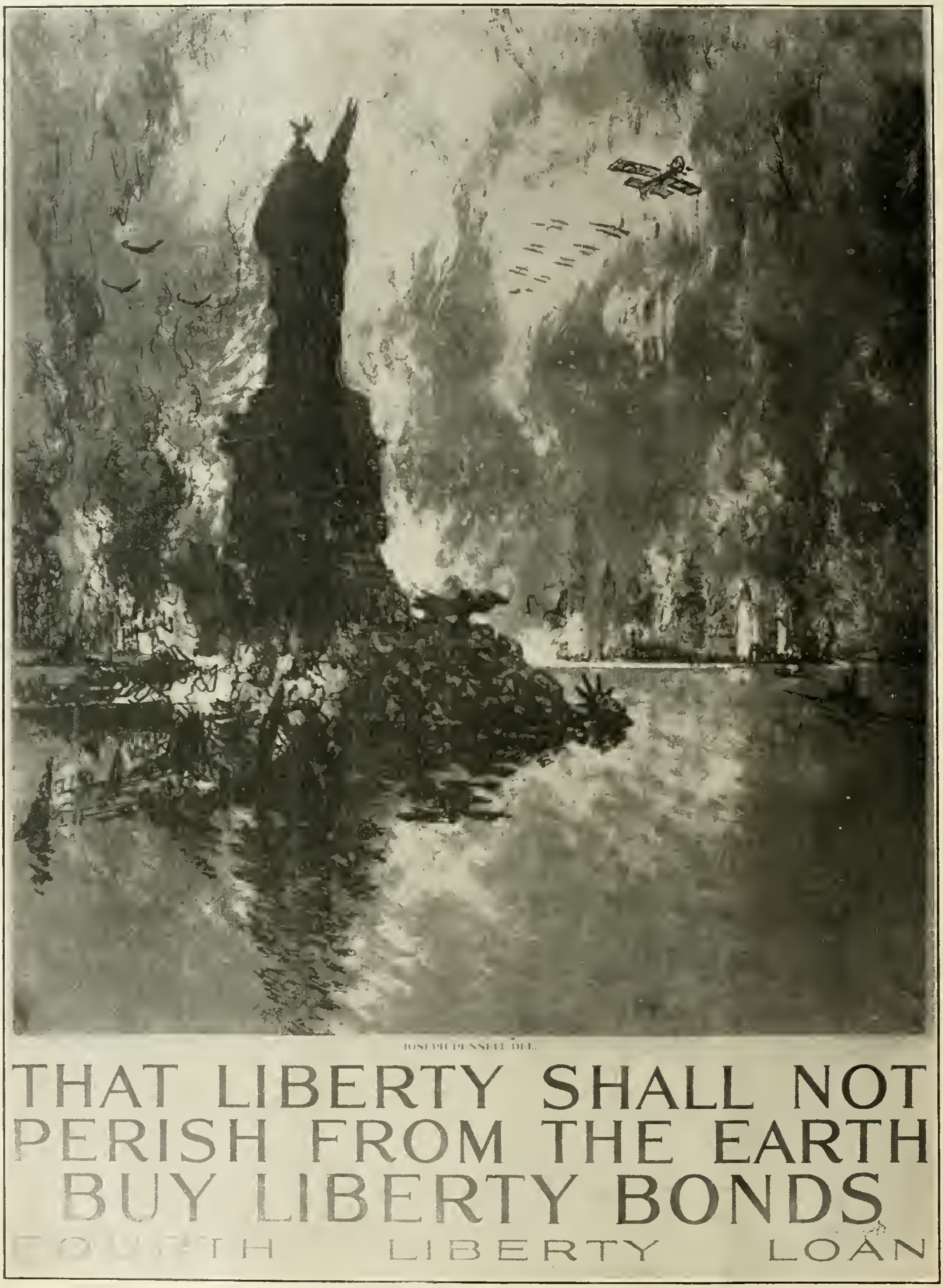

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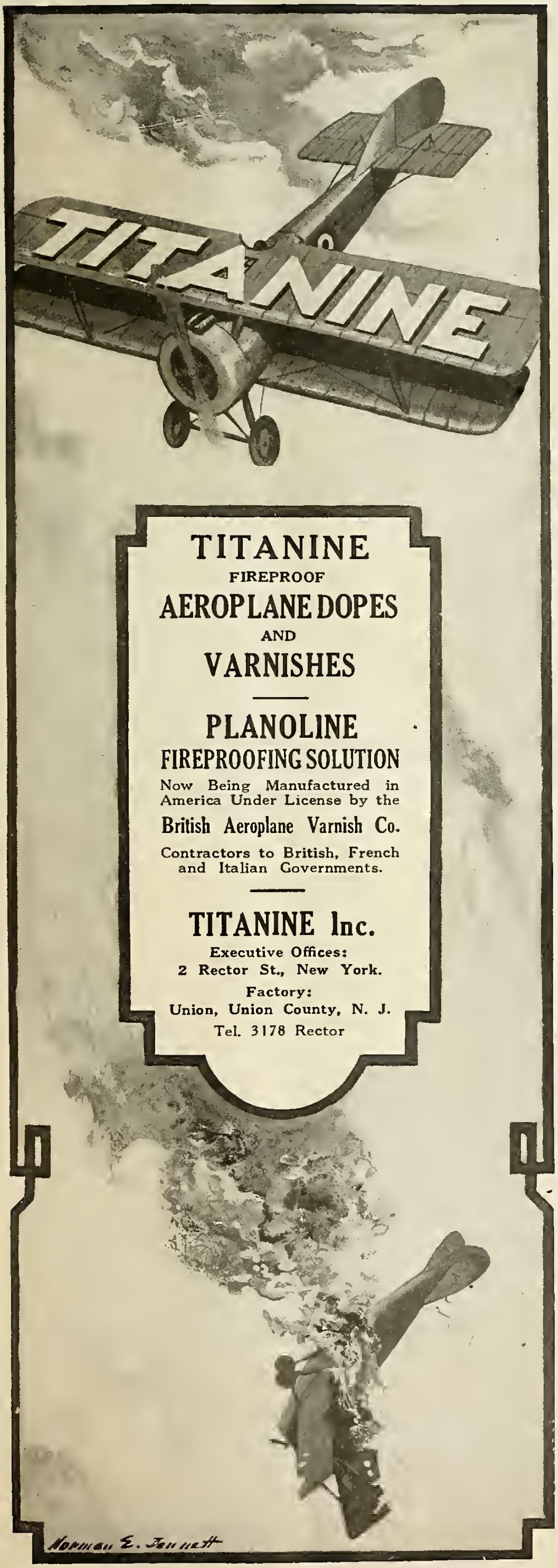

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AERIAL AGE
WEEKLY

Vol. VIII SEPTEMBER 30, 1918 No. 3

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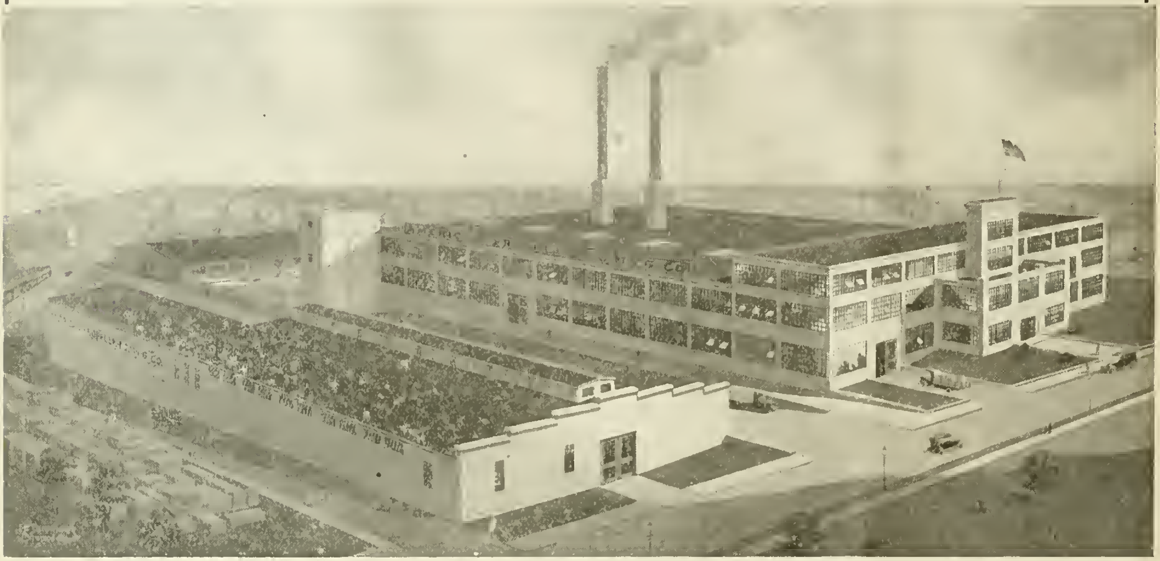

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VOL. VIII NEW YORK, SEPTEMBER 30, 1918 NO. 3

DISPATCH FLEETS OF LIBERTY PLANES

ROMERANTIN, Central France (Correspondence of The Associated Press).—Liberty aeroplanes were darting across the sky, other Liberties were drawn up in battalions across the big plain, and still other Liberties were puffing and struggling at their anchor tests, as The Associated Press correspondent arrived at this great centre of aeroplane production for the American fighting army. The nearby town of Issodoun is the great centre for American aviators.

Crowds of soldiers and workmen had gathered to see one of the fighting Liberties completely equipped with bombing machines, wireless outfit, all its guns, and every last device for going into combat. There had been other Liberties turned out, scores and hundreds of them now moving in a steady stream. In this and others which had preceded, the last step had been taken to give them their final equipment for actual fighting.

The big machine had a spread of forty-three feet across, and like all the others was of gray cloud-color seen from below, though above the color changed to green and merged into the green fields. Ahead pointed the machine-gun operated by the pilot, with synchronizing device by which some hundred shots a minute flew between the blades of the spinning propeller. Further back, in the observers' nests, two more machine-guns had a sweep of both broadsides and upward and rearward. There was no angle they could not reach, and even the Gotha trick of shooting straight down through a floor tunnel was more than matched, though details of how this is done cannot, of course, be given. It is sufficient to say that this new type, long and anxiously awaited and now a reality, armed for combat, was as formidable as any car ever produced, and in the judgment of these experts was far more formidable than any of them.

Recording Power and Speed

Climbing into the pilot's seat there was an opportunity to see the workings of this big car—the pioneer of the fighting squadrons soon to come. The powerful motor, with all its pistons jumping, was just ahead, with two long exhausts sweeping back toward the tail. Within the seat were straps to hold the pilot in a headlong flight, and all the delicacy of mechanism one sees in an automobile—speed indicator, gas meter, oil pressure, throttles, switches—and much more besides; lights for signalling, height meter and compass, and fire extinguishers to fight a blaze.

"This is the joystick," said Captain X., as he swung the lever controlling the tail and ailerons. And he pointed out that the foot rudder, which controls the horizontal movement, worked on the same principle as the bob-sled.

"Truly it is a wonder," he said, fondling the mechanism. "I know them all—English, French, Italian—and there is nothing like this for power and speed. Why?"

And then he gave an instance of what had been accomplished in a straight rise from the ground, which constitutes a record far exceeding anything before. This was made in one of the Liberties recently turned out here. It was not regarded as one of the best of the machines, and the workmen even dubbed it "False Alarm!" But it soon proved its rights. It was sent to one of the training fields, and on one of its first ascents it shot up straight from the ground to the height of 20,400 feet in 35¾ minutes.

"It is the fastest time a human being has ever gone up," said the Captain, "and it gives an idea of what is ahead when these squadrons are in line."

If details could be given of the number of these planes and the squadrons equipping for the battle line, it would cheer those who have grown heartsick with waiting and charges and investigations, and would let them know the day of real accomplishment was at hand in the thick of the fighting. Without giving numbers, it can be said that we saw these machines crowding a vast workshop in such arrays that their wings touched and covering much more than the area of a city block. They were not piecemeal cars, but all ready to go forward. They have been passing by the score daily into the hands of the aviators, and squadron after squadron was being made ready for the front.

We saw them in combat formation over the flying field of Issoudoun. This was no longer a vague promise of the remote future, it was at hand, and we saw these machines in vast number arming and starting for the battlefront.

The testing of the engines gave an idea of the tremendous power of the new cars. The cars were anchored by heavy chains, and workmen gripped the long body to keep it from plunging as the propeller started and the engines gave out a long wail. The men, gripping the chains and rigging, were swept as though in a tornado, the grass was flattened and great clouds of dust rose like the smoke of batteries. There is an awe in the power of this engine and its whirling propeller, and a danger, too, which the men have learned.

The suction of the propeller while the car is on the ground is far greater than has ever been known with other cars. A workman was drawn in and killed the other day, and the great maelstrom of rushing air sucks in everything coming within ten feet of its mouth. But this is merely a detail of testing and has no bearing on the capacity of the car for flight. Like the power of the engine, the propeller is much larger and heavier than in other cars.

This turning out of the new type of American Liberties is only one of the activities of this mammoth air service production centre located here, with huge shops and warehouses, 2,700 men, 200 officers, and 1,200 Chinese laborers. All the planes made in America come here in parts, to be assembled, tested, armed, and all the other makes of planes are mobilized here preparatory to going into use on the flying fields and the front. There is, besides, the huge work of receiving the wrecked planes as they come here riddled with bullets, their wings torn off, which tell of a fierce contest. Such as can be made serviceable again are sent back to the field, while the wreckage of those beyond repair strew an immense field and is a ghastly reminder of the heroic sacrifice their pilots have made.

The process of assembling the machines as they come from America was followed through its various stages in the six huge "bays" of the workshop, each bay having a capacity of eighteen machines, or over 100 machines going forward at the same time. Nine huge boxes bring the different parts. First, the fusilage or body is set up, the motors installed, the landing wheels attached, the wings and tail adjusted, the gun racks and armament prepared, and soon a complete car ready for flights grows out of the scattered parts.

How many are turned out daily cannot be stated, but it can be said that the capacity of this big aeroplane centre working in eight-hour shifts is fifty complete areoplanes a day. And in these days, when the mobilizing of machines follows close on the mobilizing of men, the actual production is not far from the full capacity.

ALLIED AIR CONTROL PLAINLY SHOWN

In the Week's Fighting the British Alone Destroyed 101 Enemy Planes

SO far as air fighting is concerned, the past week has been one of the most remarkable of the war. At least three aspects of the week's work will take a good deal of explaining by the Germans.

First, the British independent air force dropped more bombs on German towns in five days than had been dropped at any previous time in a fortnight.

Second, in twelve hours British airmen took more aerial photographs of German positions behind the Hindenburg line than any previously recorded day's total.

Thirdly, in a single air fight over the German coast defenses in Belgium, British airmen destroyed or drove down out of control eighteen enemy machines, or nine for each of the two British machines reported missing.

These facts show that the initiative in the air, as on land, has passed definitely into the hands of the Allies.

Foremost among the achievements of the week must be placed the remarkable effort of the independent air force against the enemy railways near Metz and in the St. Mihiel salient. It easily broke all records both as regards the number of objectives attacked and the weight of bombs dropped. Acting in conjunction with the Franco-American offensive it made thirty-five separate raids between Friday morning, September 13th, and Monday night, the 16th. Of these thirteen were directed against the vital railway junction and triangle at Metz-Sablon, four against the junction at Courcelles, eight against Saarbrücken, Kaiserlautern, and Mainz, while heavy attacks were also made upon important enemy airdromes at Buhl, Boulay, Frescati, and Hagenau.

Air attacks upon such important railway centres have a direct and powerful effect upon the military operations of the enemy, delaying much-needed supplies of arms and ammunition, disorganizing and preventing the rapid transport of troops and withdrawing large numbers of enemy aircraft from the zone of battle.

In addition there were remarkable simultaneous long-distance raids into Germany. These were directed against chemical and aeroplane factories.

In all over sixty tons of bombs were dropped in five days, or more than half the total weight of bombs discharged by the Independent Force in the preceding month, which in itself constituted a record.

On the northern battlefront in France in the course of two days' fighting, seventy-two German machines were destroyed, twenty-seven sent down out of control, and one hostile kite balloon shot down in flames, making a total of 100 enemy aircraft accounted for in forty-eight hours. In the same period thirty-two machines were reported missing.

Simultaneously with this heavy fighting in the air, British bombing squadrons were very active, dropping over seventy tons of bombs upon military objectives behind the battle line.

In all, British airmen on the western battlefront in the past week have dropped upwards of 120 tons of bombs, exclusive of those dropped in Germany, have destroyed 101 enemy machines and driven down thirty-seven more out of control. Fifty British machines were reported missing.

AIR-BOMBING CHIEF PRAISES AMERICANS

Tells of Splendid Work of Escorting Squadron Co-operating with British

THE commander of the American aero squadron on the American front has received the following letter from the chief of the British squadron, with which the American forces have been co-operating:

"I would like very much to express in writing the gratitude felt both by myself and the personnel under my command for the exceptionally fine escort work done by your squadron when escorting in bombing raids.

"We all have agreed that when the squadron is escorting in our raid we have nothing to fear from the enemy aircraft. Although it often is imperative to fly low, thus making a very long trip over the lines, nevertheless your squadron always has stuck to us.

"On one or two occasions one of our machines would straggle owing to engine trouble, but these machiness had no need to fear the attacking enemy aircraft as one of the escorting machines would always look after the straggler.

"On many occasions enemy aircraft have attempted to attack our bombing machines over the target, but they never have been successful owing to the excellence of the escort.

"Finally, I can only say that I do not consider any squadron in France is supplied with a better escort than is my squadron."

HOW THE AERIAL MAIL TOOK A REPORT TO GENERAL PERSHING A WEEK SOONER

HOW the aerial mail took a report to General Pershing a week sooner is told by the publication *Personnel*, published by the Adjutant General of the United States Army. The article is entitled "It Couldn't Be Done, But——," and read as follows:

General Pershing had cabled an urgent request that all officers be re-rated before being sent to France. A Western division was on its way and had stopped at a pre-embarkation point. It was essential that the officers make new ratings at once, particularly in view of the fact that the old ones had been inaccurate because of lack of instruction.

A representative of the Personnel organization was therefore sent from Washington to address the twelve hundred officers of the Division and instruct them in proper methods of rating. He left on the 9 o'clock train, the last one that would get him to his destination before 4 o'clock, the time appointed for the meeting.

About 9:30 it was discovered by two other members of the organization that important papers he would need were in the office—among them a complete analysis of the previous ratings of the Division that indicated clearly the improvement necessary. They knew, without being told, that lack of these papers would handicap the effectiveness of his instruction; hence some way had to be found for getting them to him.

As usual, everybody said it couldn't be done. There was no train and no other means of communication fast enough. *Yes, the aeroplane mail service operated between Washington and Philadelphia, but the mail was closed.* Besides, the mail bags were locked and could not be opened except at the Philadelphia post office. This would not allow time for the swiftest courier to reach the camp before the meeting. As a final barrier, there was no courier available.

It couldn't be done. Yet it *had* to be done. And the arrangements had to be made by telephone in less than twenty minutes, for the aeroplane was to leave at 11 o'clock.

It *was* done. The Second Assistant Postmaster General authorized the necessary steps. The papers were received and carrid by *the aeroplane* as an outside package. At the aviation field the package was dropped into the hands of a motorcycle courier sent from the camp. He sped off and arrived just in time for the meeting. As a result the new ratings of the Division from the West are accurate ratings—ratings that can be depended upon by the command overseas.

The United States Army today is an efficient army. It is demanding results and getting them. The reason is that throughout the organization is growing constantly a spirit of co-operation and singleness of purpose—a spirit which enables it to do what *has* to be done—even when told that it *can't* be done.

THE NEWS OF THE WEEK

Allied Air Services to Pool Resources

A dispatch from Paris by Charles H. Grasty, special correspondent of the New York *Times,* says:

After spending several days at aviation headquarters on the American front John D. Ryan is back in Paris working with the British and French on aviation plans. He and Winston Churchill spent yesterday together and there is close co-ordination between them and the French.

Mr. Ryan's effort is in the direction of pooling resources and getting the greatest possible force to the front in the shortest possible time. Allied representatives are meeting him in the same spirit and they are getting results.

Mr. Ryan was much pleased with the showing made by our air service in the recent offensive, which he had an opportunity of observing.

Long Island Flyers Made One Brigade

All the flying fields at Long Island will hereafter be known as the 1st Reserve Brigade of Long Island, with the main headquarters at the Hazlehurst Field, Mineola.

Lieutenant Colonel Claude K. Rhinehart will command the brigade, which includes Hazlehurst Plateau, the H. J. Damm Field at Babylon, the Brindley Field at Comac, the Major Lufbery Field at Wantagh and the Mitchel Field at Hempstead.

Major Robert D. Wrenn commands the Mitchel Field; Lieutenant Colonel Archie Miller, the concentration field; Major Whitten J. Fast, Brindley Field, and Captain H. B. Peters, Hazlehurst Plateau. Major Thomas Hitchcock commands all flying and his assistant is Captain F. H. Harvey.

Major John S. Phipps, formerly a crack polo player of Meadow Brook, is the executive officer of the brigade. The brigade adjutant is Lieutenant James J. Gambs, and Lieutenant J. R. Homer Akers is his assistant. Lieutenant John R. McKee of California and Lieutenant James D. Cassel, who is a son-in-law of Inspector General A. W. Brewster, are adjutants for the Hazlehurst Field.

Athletic Equipment for Army Aviators

An appeal for athletic equipment, and also musical instruments, for the enlisted men of our aviation forces has been issued by the National Aeronautic Committee, 289 Madison avenue, New York, of which Mrs. Newton D. Baker is honorary chairman, and Mrs. Charles A. Van Rensselaer, chairman. The committee, which is under the direction of the War Department Commission on Training Camp Activities, has received requests from officers in command of Army air squadrons going overseas and also from all air training stations in this country, to supply equipment for baseball, football, soccer, basketball, track athletics, volley ball, indoor baseball, medicine balls, punching bags, boxing gloves, etc. Major General Kenly endorses this work, it is stated.

---

75 Planes to His Credit

Toronto.—Capt. McCaul of the Royal Air Force, who is said to have brought down seventy-five German aeroplanes, or three more than the number credited to Lieut.-Col. Bishop, Canada's crack aviator, arrived here on Sept. 17 en route to spend a six months' furlough at his home in western Canada. He was aboard the steamship shelled by a German submarine a few miles off an Atlantic port.

Capt. McCaul, who wears the D. S. C., Military Cross, and the Distinguished Flying Cross, is said to have been recommended for the Victoria Cross.

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5 Yankee Flyers Win Decorations on British Front

With the American Armies in France.—The brilliant work of the American airmen on this front, particularly during the great August battle, has been quickly recognized by the British, who have just conferred the coveted Distinguished Flying Cross on five American airmen. This is the first time such a decoration has been awarded to airmen not of British nationality.

In August occurred the first battle where all the American units pacticipated under American leadership, and of seventy-five machines downed during the month by the Americans most of them were brought down by these units, and this does not include unofficial victories or indecisive combats. One unit had twenty indecisive combats, and one pilot who is credited officially with six destroyed enemy planes has seven unofficial victories which he has not claimed.

Among those decorated are Lieuts. G. M. Vaughn of Washington Avenue, Brooklyn; Merton L. Campbell of Wakeman, O.; L. A. Hamilton of Burlington, Vt.; Thomas J. Herbert and James A. Keating.

Ensign Arthur Childs Burns, Senior Flight Officer, United States Air Station, Rockaway Beach, L. I.

New Aviation Base

The Government is planning to establish an aviation base in San Pedro in connection with the submarine base in the outer harbor.

Camp Greene to Be Enlarged

The biggest aviation training and concentration camp in the world is to be established at Camp Greene, N. C. Announcement to this effect has been made by Secretary of War Baker. As rapidly as possible arrangements will be made to provide accommodations at the camp for at least 15,000 aviators, and after the camp gets in full swing it is expected that as many as 25,000 fliers will be in training there at one time.

Camp Greene has been abandoned as a divisional training camp. More recently it has been used as a remount station, but this also will be discontinued, the remount service being removed elsewhere. The camp is located near Charlotte, N. C.

AT AN AMERICAN REST CAMP IN SOUTH OF ENGLAND CENTRE
Major Mackenzie Rogan, M.V.O., Bandmaster of the Coldstream Guards and part of the American Air Service Band

Putnam, American Ace, Killed Near St. Mihiel

First Lieutenant David E. Putnam of Newton, Mass., American ace of aces, was killed on Thursday, Sept. 12, while on patrol along the American lines north of St. Mihiel.

Lieutenant Putnam was flying with Lieutenant Wendella Robertson, when they were attacked by seven German machines. Four of these made for Putnam's aeroplane, and three attacked Robertson's. The attack was sudden and unexpected, and the enemy was able to fire from above.

Lieutenant Putnam was shot twice through the heart. His machine glided to the earth at Limey, within the American lines, where he was found by his comrades.

Lieutenant Putnam, who was 19 years old and a descendant of General Israel Putnam, had twelve aerial victories to his credit. He enlisted as an aviator with the Lafayette Flying Squadron, and made his début Dec. 20, 1917. After seven months' training and one month's service at the front he fought his first battle and won it on Jan. 19, 1918.

One of his longest and hardest fights was on April 11, when he engaged four two-seaters for thirty-five minutes, and brought down one of them. The next day he got two out of a German "circus" of six machines. On May 15 he was engaged at close quarters with a two-seater, who fell forward, pierced by a bullet from Putnam's gun.

The young American aviator was made famous by his work in a fight on June 5, when he brought down five of an enemy squadron of ten Albatrosses. The fight took place over the battlefield of Rheims.

Speaking editorially of Lieut. Putnam the New York *Sun* says:

No American aviator had a finer single exploit to his credit than Lieutenant David E. Putnam, who has gone the way of Lufbery, Thaw, Roosevelt and many others of our young heroes of the air.

His performance above Rheims last June, when he engaged ten enemy Albatrosses and brought down half of them, has not been surpassed in the war unless perhaps by Fonck, the greatest of the French fliers since Guynemer.

Putnam was not only a great aviator, but an aggressive fighter, who went into the clouds for his foe as his ancestor, Israel, went into the cave for the wolf.

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150 Yankee Air Raiders Bomb Retreating Troops

With the American Army in Lorraine.—The Germans in their retreat from St. Mihiel used two main roads. The Americans closed one of them and the sole avenue of escape left to the enemy was the St. Benoit-Woel road. Congested transports of troops and guns were struggling along the road when there suddenly appeared 150 American airmen carrying small bombs and 500 rounds of ammunition each.

Swooping down the road they pelted the bombs and bullets. Horses fell and men ran and wagons disappeared. All that was left was a jumbled mass, which enabled the American troops to make a large haul.

The War Department Authorizes the Following

Cadets and student officers at Kelly Field, Texas, are beginning a new system of instruction which will eventually require them to actually construct the ships in which they fly. This course is a departure from the regular curriculum. It is not yet general and had yet to be approved by the Training Section. At present the work amounts to twelve days in putting together wings and fuselage only. The other parts of the shop will come in little by little as the course advances, until the practical assembling of a complete aeroplane is a part of the instruction of every flyer. Instructors believe that if American flyers are required to put together the ships that they will later control, there will be less carelessness, less tendency to hurry work being done, or to overlook anything that might endanger life later on.

The new course of instruction at Kelly Field will take the prospective flyer completely through all the shops. The aeroplanes put together will be inspected by experts before they are flown and whenever an error is found in assembly the cadets or student officers who put this particular machine together will be shown what might have happened to the flyer had not the error been detected in time.

It is further believed that the new course will acquaint flyers with the functioning of all parts of their machines so that in case of forced landings they will be able to make repairs sufficient to take them home.

La Guardia is Made Major of Aviators

Congressman Fiorella H. La Guardia of New York City, who as a captain in the United States Aviation Service in Italy has been mentioned many times in dispatches for bravery, has been promoted to be a major. The promotion appeared in the army orders. Mr. La Guardia was one of the first legislators to obtain a leave of absence to serve his country on the firing line.

Embryo U. S. Aviators Fight Imitation Hun

In their eagerness to win top score over their competitors the instructors of the Gunnery School at Rockwell Field, Cal., Division of Military Aeronautics, have devised a floating sleeve target which resembles a small cylindrical shaped balloon, and when released in the air is used as the floating target at which the air gunners shoot.

At an elevation of 5,000 feet the target is released. Then the shooting begins, the aeroplanes diving at the target or running from it and using in the game every stunt known to fliers. At the mercy of air currents and being light in weight, the sleeve target twists and turns in every conceivable manner and direction, all of which tends to make it as tricky as a Boche opponent. Service ammunition is used by the gunner and this target practice takes place over areas on which there is no habitation.

The Egyptian Flying Forces

The efficiency of the British air service has been strikingly illustrated by the list of honors bestowed on officers and other ranks of the Royal Flying Corps serving with the Egyptian Expeditionary Force in 1917. The list follows:

Victoria Cross	1
D. S. O.	4
Military Cross	34
Croix de Guerre	2
Military Medal	1
Meritorious Service Medal	14
Order of the Nile	2

The airmen's work was of incalculable value during the march of the expeditionary forces northwards from the crushed Gaza-Beersheba line. The patrol work was so effective that only one enemy machine penetrated the area from which its occupants could see the movement of troops about to attack Beersheba. This was brought down by the British aviators.

Perilous long-distance flights were made by the Englishmen in Palestine, three of whom bombed Maan after a trip of 150 miles from an aerodrome in a straight course over desert land so rough that it would have been impossible to come down without seriously damaging a plane.

Aerial Gunnery and Trick Flying School

The largest aerial gunnery and trick flying base in America will be established by the War Department at Rockwell field, on North Island at the entrance of San Diego Harbor. The schools there for training army airmen will be patterned, largely, after those at Cazeau and Avord, France. The students will receive advanced training at Rockwell according to the schedule of the great French schools.

Don't Kill Carrier Pigeons

Legislation is urged in several states to make it a federal offense to kill the carrier pigeon. This action results from the slaughter of these birds near training camps, particularly in Kentucky. Carrier pigeons are of vital importance in modern warfare, carrying messages when all other means fail.

Ensign Harold A. Pulliam, holder of Hydroaeroplane Certificate No. 237, of the U. S. Navy. His brother, K. G. Pulliam, is Captain in the Army Air Service

American Aviation Camps in France

America has an aviation camp in France, with barracks for 6,000 men, space for many hangars, rest rooms, Y. M. C. A. huts, warehouses, spare-part stock rooms and a machine shop. This mushroom city rose over night on the spot where three months before General Pershing splashed through on one of his inspection tours.

One West Point officer runs the entire camp. No pilot goes there who has not had some training elsewhere and the school is meant especially for the combat and bombing pilots.

Arizona Flyer Downs Three Foe Observation Balloons

With the American Army on the Lorraine Front.—Three enemy balloons were destroyed on Sept. 17 by Lieut. F. Luke, Jr., of Phoenix, Ariz., on a flight into the German lines. This makes his total nine balloons in three days.

With Lieut. J. F. Whener of Everett, Mass., Luke left his aerodrome at dusk and crossed the line. Within thirty-five minutes the American aviators had completed their work of destruction and the flames could be seen from the American aerodrome.

One other balloon was destroyed and three more are believed to have been shot down, but the reports have not been confirmed. Bad weather prevented bombing, however, and the only observation possible was the adjustment of artillery fire.

German aviation machine gunners and bombers attacked what they supposed to be the American positions in the region to the west of Vandieres on Sept. 17. The mist and low clouds, however, prevented the Germans from finding their targets. The Germans themselves were located and driven back by anti-aircraft fire.

The flying machine gunners dropped near the ground at several places in their determination to find the American troops, but the weather conditions were too much for them. The bombers flew at higher altitudes, but they, too, were hampered by the weather and possibly by misinformation as to the American positions, and wasted numbers of bombs.

Owing to the effectiveness of the American and French anti-aircraft fire, a number of the German machines were hit, the observers reported. When last seen the crippled planes were returning hastily to their own lines.

American aviators have performed many feats of daring and endurance the last few days.

One of the most trying experiences was that of Lieut. Snyder of a reconnoissance group, who flew with another officer over the enemy lines at a height of less than 1,000 metres in a rainstorm. They remained in enemy territory more than two hours, always flying at a low altitude.

They penetrated a distance of thirty-three miles and brought back much valuable information. Although they were repeatedly fired at by anti-aircraft guns and passed through several rainstorms, they returned safely.

The large part which aviation has played in the offensive operations is indicated by the summary of the first four days of the battle. According to this, despite the heavy rains which transformed the airdromes into seas of mud and seriously handicapped them for at least two days, the aviators were not only able to make more than 3,300 sorties, covering a period of 4,000 hours, but so thoroughly bombed the enemy aerodromes that the enemy was unable to accomplish much.

Five U. S. Planes Missing

Gen. Pershing reported in the communique of Sept. 18 as follows:

In the course of a bombing operation in Lorraine our aviators were attacked by superior forces. Five of our machines are missing.

Lieut. Ray Brooks an "Ace"

A press dispatch says Lieut. Ray Brooks of Boston qualified on Sept. 16 as an American ace by shooting down his fifth enemy plane. Lieut. Horace Lake, formerly an architect in Washington, D. C., and Lieut. Bertram Neideneker of New York City, in a French machine, are credited with being the first Americans to go over and shoot up the new German positions. Flying less than fifty yards from the ground they sprayed the roads and shell holes filled with enemy troops and returned safely.

Specialists May Choose Branch of Service

Washington, D. C.—After October 1, registrants of September 12 may be inducted into special branches of the army, which are in need of men, and for which the registrants are specially qualified. The wide-open volunteer system will not be accepted again.

Persons inducted into the army under this system must enter as privates and may be sent to officer training camps, whence they may be commissioned, but if they fail of commission they remain in the army as privates. The War Department has also let it be known that the day of civilians stepping into the army with commissions is practically at an end.

If a man goes to an officers' training camp he comes out a second lieutenant or a private. When the department needs a first lieutenant he will be promoted and so on to the captaincies and higher officers. Only a highly trained expert very necessary to the military is likely to receive a commission higher than that of second lieutenant; and practically all successful applicants for even second lieutenancies must come from the ranks.

War and Navy Department officials are now struggling with the regulations governing assignment of draftee men to army, navy and marines. It is possible registrants who are drafted may be allowed to indicate any special qualifications for these services, which the local boards may take these services local boards may take into consideration in certifying them in response to calls.

However, the tendency in the Provost Marshal General's office just now is to take from the local board the authority of decisions of this kind and the Navy Department seeks some more definite means of fixing the qualifications for men certified to it for service.

Balloon Cable as Aerial

Reports received at the Division of Military Aeronautics from Balloon Training Fields in various parts of the country, show several unusual messages received by the wireless crews, indicating increasing efficiency both in the work of the students and the equipment. The wireless station at Arcadia, California, by using for an aerial the cable of a balloon put aloft from the training field, has intercepted messages sent by the Brooklyn (N. Y.) Navy Yard. This balloon cable probably makes the highest aerial in the world.

This particular school has 106 miles of wire in use for teaching military communication. For the purpose of demonstration it has a complete system of wiring strung as it would be in the front line trenches. Communication posts and stations for all kinds of messages are used by the students the same as soldiers use them at the front.

A good part of the country southeast and southwest of Arcadia is laid out with lines of communication to this balloon school, similar to part of a sector at the front. All of the balloons, when aloft, are so wired that they can be linked together with any trench, doubled up for any work together, or they can be cut off from the trenches and talk only with their own chart room and winch or operating crew on the ground below.

(*Continued on page* 141)

One of the New York Air Raid Sirens which opened the Fourth Liberty Loan Campaign by sounding at 7.55 P. M. on Friday, September 27th. The Sirens all over Greater New York sounded for five minutes and at 8.15 P. M. they sounded the "all clear" signal. The use of the Sirens not only reminded people of the Fourth Liberty Loan, but they gave people an idea of the alarm which would be sounded in case of an actual air raid

Hon. Albert S. Burleson, Postmaster General
Hon. Otto Praeger, Second Assistant Postmaster General
Captain Benjamin B. Lipsner, Superintendent Aerial Mail Division

US
AERIAL MAIL

AERIAL MAIL PILOTS

- Max Miller
- Maurice A. Newton
- Robert Shank
- Ed. V. Gardner
- C. D. De Hart
- Louis Gertson
- R. Smith

George Langley Conner, Chief Clerk to Second Assistant Postmaster Praeger
Charles M. Kight, Special Representative
John A. Jordan, Special Representative
Frank Bowie, College Park, Md., Representative
Harry L. Hartung, Belmont Park, L. I., N. Y., Representative
H. Thomas, Bustleton, Penn., Representative

AERIAL MAIL MECHANICS

- Henry Wacker
- E. N. Angle
- A. F. Cryder
- Ed. C. Radel
- Wm. C. Read
- W. O. Beatty
- Chas. King
- J. A. Danville

PARIS AEROPLANE MAIL SERVICE INAUGURATED

The first trial of the aeroplane post from Paris to St. Nazaire recently. Two planes made the trip, leaving from Le Bourget and making one stop at Le Mans. The first plane carried over a thousand letters; the second followed in case of accident to the first. The Minister of Posts and Telegraphs, the President of the Aeronautic Commission, and many other officials witnessed the start of the initial flight. The photo shows the pilots who made the trip

Aero Mail Defies Storm

The storm at Belmont Park on September 18 was the worst of the month, but it did not stop the aero mail service. Pilot De Hart waited an hour and then flew south at the height of the storm, while Pilot Robert Shank came through in about the usual time from Washington and reported that he had flown from cloud to cloud, encountering the worst storm since he had been flying on the aero mail route. He kept as near the earth as possible. He left Washington at 11:45 A. M. and landed in Belmont Park Field at 2:50 P. M.

New Mail Flight Record Washington to New York

All records of mail flights from Washington to New York were broken Sept. 17 by Aviator Miller, accompanied by Aviator Newton as a passenger and the mail. The same aeroplane was used for the entire trip—a standard plane with a 150-h.p. engine. The plane left Washington at 11:36 a. m. and arrived at Philadelphia at 1 p. m.—1 hour and 24 minutes, or a speed of 91½ miles per hour. It left Philadelphia at 1:07 p. m. and arrived at New York at 1:50 p. m.—43 minutes, or a speed of 125½ miles per hour.

Time, Washington to New York, including Philadelphia stop—2 hours and 14 minutes, or a speed of 102 miles per hour. Time, Washington to New York, actual flying time, 2 hours and 7 minutes, or a speed of 108 miles per hour.

Monthly Report of Operation and Maintenance

UNITED STATES POST OFFICE AERO MAIL SERVICE

FOR JULY 1918

Aeroplane No.	Gasoline	Grease and Oil	Office Force	Motorcycles, Trucks	Rent, Light, Fuel, Power, Telephone, and Water	Miscellaneous	PILOTS		HANGAR MEN		MECHANICS		Repairs and Accessories	Interest on Investment	Departmental Overhead Charge	TOTAL	SERVICE AND UNIT COST					
							Actual time	Dead time	On plane	Miscellaneous	On plane	Shop time					Gallons of Gasoline	Total time run	Total miles run	Miles run per gal. gas.	Cost per hour	Cost per mile
																		hr. mi.				
38262	$77. 34	$27.95	$16.94	$98 51	$15.73	$57.44	$61 90	$43 73	$84 32	$22 00	$45 12	$20 35	$66 77	$71 42	$55 30	$764 82	254	21 18	1460	5 74	$35 90	$ .5238
38274	143.72	47 04	16.95	98 51	15.73	57.44	98 06	43 74	84 32	22 00	136 00	20 35	695 58	71 42	55.30	1606 16	471	35 44	2450	5 20	44 95	.6555
38275	49.20	14.29	16 94	98.51	15.73	57.44	39 34	43 74	84 33	22 00	29 53	20 35	757 83	71 42	55.30	1375 95	162	13 07	710	4 38	104 90	1.9379
38276	46.08	16.49	16.94	98 51	15 74	57.44	33 70	43 74	84.33	22 00	73 39	20 35	18 40	71 43	55.30	673 84	151	9 05	630	4 17	74 18	1.0695
38278	124 76	41 69	16.94	98.51	15 74	57 44	116 62	43.74	84 33	22 00	108 35	20 35	67 22	71.43	55.30	944 42	409	27 18	2063	5 04	34 59	.4577
39362	57 60	4.60	17 67	98 51	15.74	57.44	11.08	43 74	63 46	22.00	60 20	20 35	263 55	71 43	55 30	862 67	192	5 13	450	2 34	165.36	1.9170
39363	150 30	9.46	17 66	98.51	15.74	57.45	84 32	43 74	63 10	22 01	117 08	20 35	2 89	71 42	55 30	829 33	501	19 11	1710	3.41	43.22	.4849
39365	130 30	18 79	17 66	98.51	15 74	57 45	94.20	43 74	63 10	22.01	117 26	20 35	202 34	71 42	55 30	1028 17	441	20 21	1820	4.12	50 52	.5649
39366	113.70	10 39	17 66	98 51	15.74	57 45	94 36	43.74	63.09	22.01	106 56	20.35	262.23	71 43	55 30	1052.52	379	23 11	2093	5.52	45 39	.5028
39367	75 80	7.99	17 66	98 51	15.74	57 45	58 16	43 74	63 09	22.01	88.54	20 35	167 81	71 43	55 30	863 58	251	14 25	1215	4.84	59.90	.7107
Total	$968.80	$198.69	$173.02	$985.10	$157.37	$574.44	$691.74	$437 39	$737 47	$220 04	$882 03	$203 50	$2504 62	$714.25	$553 00	$10001.46	3211	188 53	14601	4.54	$52.95	$ 6849

Note.—Depreciation is not estimated in this report, for lack of convincing data, but is reflected in the items under repairs, parts and labor.
Items for rent, light, power, etc.; misc.; dead time of pilots; time of hangar men, misc.; shop time of mechanics; interest on investment; and departmental overhead charges; all of which are not directly apportionable to individual ships, are pro-rated equally between all of the ships.

Aerial Mail Service in Canada

AERIAL mail service is being extended throughthe world. During the last month cables have brought reports of flights for the delivery mail and important government communications in Sweden, Norway, France, Italy, Great Britain, India and Japan. Except for the postplane deliveries in France and Italy, these flights abroad have been practically all experiments. The success of the daily uninterrupted postplane service between New York, Washington, Philadelphia and Boston has brought insistently to the attention of all other governments the necessity for this rapid and certain means of communication.

Uncle Sam's neighbor to the north is the latest to try the aerial mail service. Canada has been so busy training youths for aerial combat service abroad that it has had little time to give to the development of commercial aeronautics. But the Canadians have been alive to the possibilities of commercial aviation. Lieutenant Georges Flachaire of France recently gave a remarkable flight demonstration from Montreal to Toronto and thence on to Cleveland. A Canadian flight officer. Captain Bayne, flew in June with pouches of mail from Montreal to Toronto. He made the trip in seven hours, landing on the way at Ottawa. The flight took seven hours and was notable as being the first trip made in Canada for the delivery of government mail.

Miss Stinson's Flight

Shortly after the full success of the United States aerial service was realized, the control of the service passed into civilian hands under the control of the postmaster-general. Canada is not far behind, as may be judged from the first civilian flight with government mail made by Miss Katherine Stinson, a Curtiss flyer, on July 9, 1918. Miss Stinson flew from Calgary to Edmonton, Alberta. Hers was the first flight of the kind ever made in Western Canada.

Miss Stinson, a few years ago, was similarly honored by the United States Government.. She adds to her aerial honors the privilege of having been the first civilian to fly with mail in Canada. The editors of the leading Canadian papers speak of the flight as the actual inauguration of aerial mail service in the Dominion.

The Canadian Government has a monopoly on the handling of all mails in the Dominion. Miss Stinson was enabled, however, to make the flight through the special dispensation granted by the postmaster-general at Ottawa.

Making Canadian Record

Late in June, Miss Stinson winged into western Canada with her Curtiss aeroplane and she circled over the wide prairie stretches of the wonderful country, visiting the ranching communities. On July 9th, she was in Calgary with her Curtiss plane. Calgary is one of the wonder cities of Canada. It sprang up over night on the western frontier of Alberta. To the north is Edmonton, which until recent years was an outpost of civilization in Western Canada. But they are cities of enterprise and spirit. They are the marketing centers of the great grain basket of the Dominion. The Calgary Exhibition was in full swing at the time. Miss Stinson's flight became the climax of the successful showing of the products of the limitless prairie, draped negligently over the horizon.

Night Trip in Daylight

Promptly at 6 P. M., July 9, 1918, Miss Stinson opened the throttle and bumped over the gopher holes of a field north of the city. She was in the aid in a second and sought an altitude of 3,400 feet. Two hours and five minutes later, she swooped as gracefully as an eagle over the landing field at Edmonton and made a perfect landing. Miss Stinson, America's greatest woman flyer, had flown the 196 miles in exactly 125 minutes.

In the cockpit of the machine, Miss Stinson carried a pouch containing 259 letters. One was addressed to the Honorable Mr. Brett, premier of the Province of Alberta. Others were addressed to the mayors of the cities of the plains, to the police chiefs, to army officers, to postmasters, to women's clubs and to newspapers. Postmaster King of Calgary had personally cancelled each of the letters. The postmaster of Edmonton officially received the mail pouch when Miss Stin- landed at the capital city.

In the enthusiastic crowd which gathered about Miss Stinson's Curtiss plane when she landed at Edmonton were two Royal Flying Corps officers. One of them had but recently returned from overseas service and the other had finished his course of training and was ready to join the British flyers abroad. They knew the worth of the Curtiss machine; they had completed their training in the cockpit of these reliable machines. But they were surprised that a woman, frail and girlish as Miss Stinson, had been able to complete the flight in an elapsed time they would have been proud to have made.

Guided by School Map

The flight was made in broad daylight. It is quite possible during this season of the year to read a newspaper in the open as late as 10.30 o'clock at night. Daylight continues long after the sun has sunk below the wheatfields. In the flight, Miss Stinson guided herself with the aid of a schoolbook map she had torn from a book. The splendid little flyer has a habit of using any sort of a map which is readiest to hand when she is about to cloud-trek across country. She had no difficulty in directing her course with this small map. On the back of it ,she wrote an account of her trip and sent it to the welfare division of the Curtiss Aeroplane and Motor Corporation.

AIR SERVICE OPEN FOR ENLISTMENTS

IRRESPECTIVE of status in the draft, the Air Service has been reopened for induction of mechanics and of candidates for commission as pilots, bombers, observers and balloonists, after having been closed, except for a few isolated classes, for the past six months.

The fast moving overseas of air squadrons, planes, motors and material for American airdromes, fields, and assembly plants in France and England, together with the completion here of 29 flying fields, 1,200 de Haviland planes, 6,000 Liberty motors, the parts for the first heavy night bombers, 6,600 training planes and 12,500 training engines, has led to the necessity of increasing both the commisisoned and the enlisted personnel in order to maintain full strength in this country and continue the necessary flow overseas. As a result the Air Service, alone, is now half as large again as the whole American Army at the outbreak of war.

Civilians have not been given an opportunity to qualify as pilots since last March. During last fall and early winter, a reservoir of over 6,000 prospective flyers, accepted by the Examining Boards, had been built up, and has since been gradually drawn off as room has been made for them in the aviation ground schools through graduation. Moreover, a large number of men already serving in the ranks of the Air Service have been permitted to train for commissions, in line with the policy of promoting men from the ranks whenever possible.

The available number of men possessing the necessarily very high qualifications is insufficient for the needs and as a result it is now possible to examine and accept men from civilian life, in addition to those in the enlisted personnel. The number of men who must be examined is great indeed compared to the number of men who become finished pilots. Practically one applicant out of every two is found unfit for flying at the first examination, while, even of those accepted, a large number prove wholly unable to do the mental work necessary in learning the theories of flight, radio, photography, bombing, machine gunnery, and artillery observation, so that fully 15 per cent are disqualified in the first step at the ground schools and still more in the actual flying courses later.

While this present call for flying candidates is being made generally, it is hoped that in order to avoid unnecessary pressure on the Examining Boards, possible candidates will consider whether they have both the physical and the mental qualifications necessary. The age limits for flyers are from 18 to 30 inclusive, with preference to those under 25, and for balloonists from 18 to 45. Applicants may apply at the Aviation Examining Boards located at:

Atlanta, Ga., Georgia School of Technology.
Boston, Mass., 739 Boylston Street.
Chicago, Ill., 230 East Ohio Street.
Dallas, Texas, Camp Dick.
Fort Sill, Okla., Post Field.
Los Angeles, Calif., Marsh-Strong Building.
Mineapolis, Minn., University of Minnesota.
New York City, 104 Broad Street.
San Antonio, Texas, Fort Sam Houston.
San Francisco, Calif., 55 New Montgomery Street.
St. Louis, Mo., 525 South Euclid Avenue.
Washington, D. C., Building "D," Floor 1, Wing 2.
Canal Zone, Camp Sherman.
Or to the Personnel Section, Division of Military Aeronautics, Washington, D. C.

The call for mechanics opens the Service to a large number of skilled men anxious not only for active field service, but also for service for which their training best fits them. Skilled men only are wanted. Others would have no value in the highly delicate and technical work required. Those accepted will be sent to a Concentration Depot, trade tested, given a special intensive training in the new science of airplane mechanics, and then organized into aeroplane crews and squadrons, some for duty here, others for duty overseas, with especially good opportunity for advancement, since over four-fifths of the men are promoted above the grade of private. The classes especially desired as shown by the last year's experience are:

Airplane mechanicians, cabinet makers, chauffeurs, electricians, auto mechanics, radio operators, motorcyclists, tailors, instrument repairmen, armorers, carpenters, clerks, motor mechanics, riggers, engine repairmen, propeller makers, stenographers, machinists.

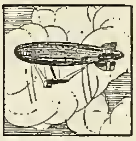
The Air Service today is over 160 times what it was on the outbreak of war.

Applicants, as mechanics, who will be accepted between the ages of 18 and 55 inclusive, may receive further details from the Department Air Service officers in the six departmental headquarters located at Boston, New York, Chicago, San Francisco, San Antonio, and Charleston, S. C.; the Air Service Trade Test Boards located at:

Army Recruiting Office, Atlanta, Ga.
739 Boylston Street, Boston, Mass.
230 East Ohio Street, Chicago, Ill.
Tramway Building, 14th and Arapahoe Streets, Denver, Colo.
Third Floor Municipal Courts Building, Detroit, Mich.
104 Broad Street, New York City.
Care of Department Air Service Officer, Western Department, San Francisco, Calif.
Third and Olive Streets, St. Louis, Mo.
Madison, Wisconsin.
Fifth and Dodge Streets, Omaha, Neb. (Army Building).
Care of Air Service Mechanics Training School, Overland Building, St. Paul, Minn.
Kelly Field, San Antonio, Texas, Air Service Mechanical Training School.

Or by writing direct to the Personnel Section, Division of Military Aeronautics, Washington, D. C.—Committee on Public Information.

MILITARY AEROSTATICS



By LIEUT. H. K. BLACK, R.F.C., C.F.A.

THE life of a balloon at the front is variously estimated at from one hour to several months, depending entirely on weather conditions and the accuracy and persistency of the enemy aeroplanes and anti-balloon gunners. In camps in the United States the average effective life of a balloon may be said to be four or five months, barring accidents.

Handling a balloon in the field has a great deal to do with its life. In camps in the United States the average effective life of a balloon company depends a good deal on balloon construction.

In the case of a balloon with the observer in the basket and the artillery officers still farther away, the problem is to transmit the orders and information accurately and quickly. These communications are maintained by means of the etlephone. The telephone wire is sometimes a separate cable, but in some cases the telephone wire is in the center of the main cable. This is a specially stranded ¼-inch steel cable.

The windlass by which the cable and the balloon are controlled is mounted on a truck which can travel while the balloon is in the air. Also originally of French invention, the construction of this apparatus has been undertaken by American companies.

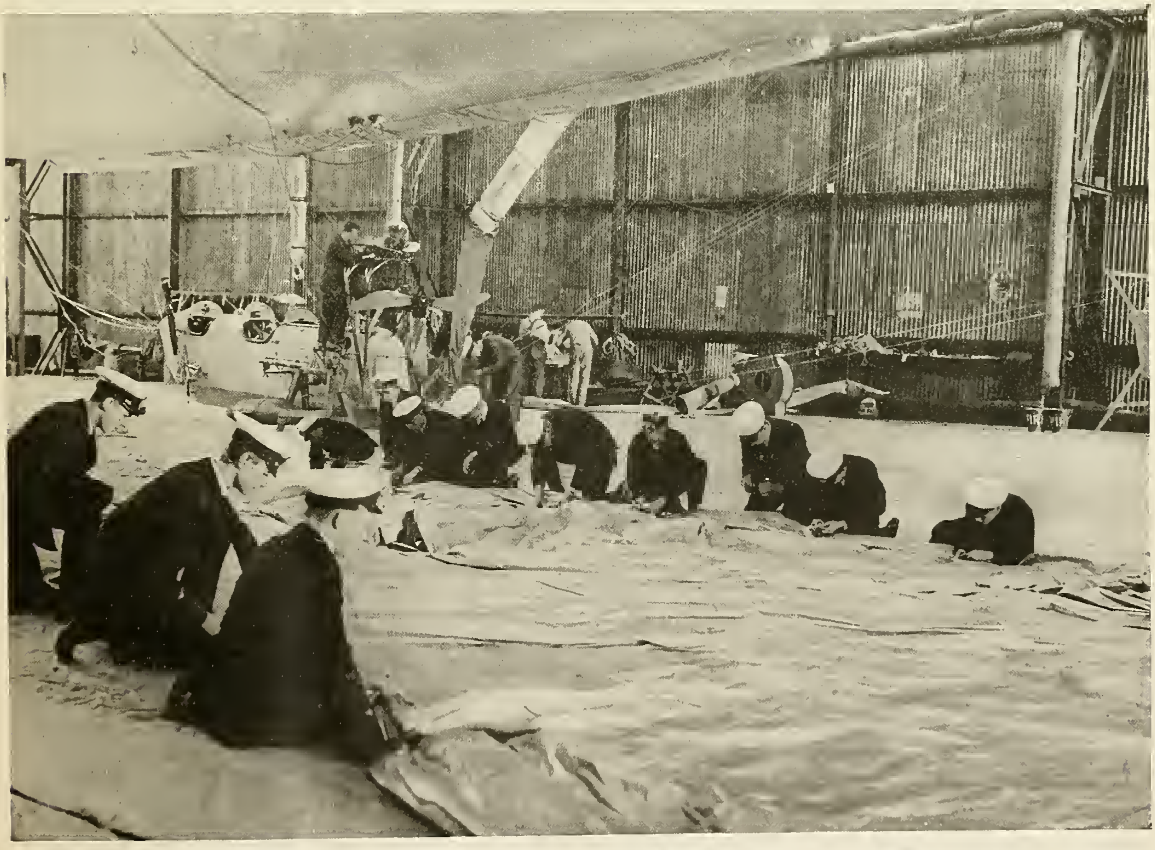
Many other accessories had to be specially developed for the balloon service. The production of hydrogen and the necessary equipment was a big problem involving work along many angles. First, the gas itself, including field generators and main supply stations; secondly, containers for shipping and storage purposes; third, methods of transferring the gas from the containers for shipping and storage purposes, and, fourth, methods of transferring the gas from the containers to the balloon.

Along with the production of balloons, the necessary inspection was a factor not overlooked. In this connection the best balloon talent known to the Allies has come forward, stepped into the harness, and built up the presetn organization which passes on all the army balloons manufactured in the United States.

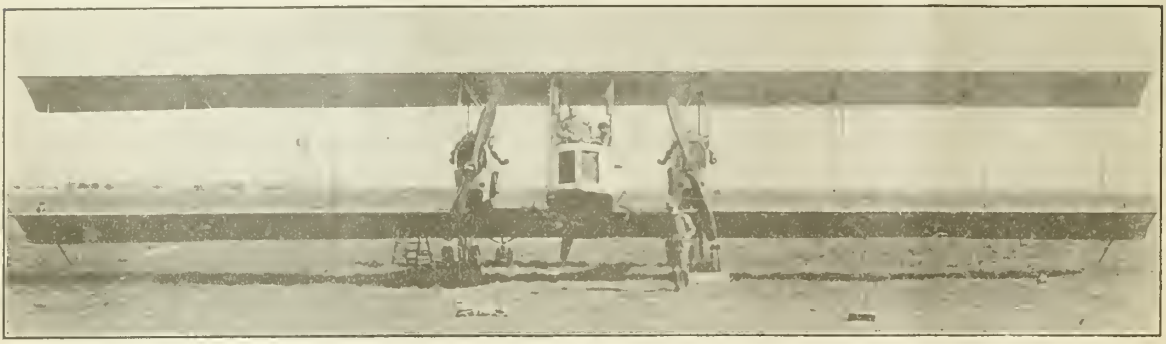
Balloon Beds

MANY different kinds of beds for balloons have been tried in the Allied armies since war broke out. As has been the case with a great many present-day practices the present bed was evolved after many trials. The best features of all the experiments have been retained and those things which have hindered the greatest efficiency of the balloons have been gradually eliminated. Not all these things have been done away with, however. The balloon bed as it is in general use today in France is not all that could be desired, but it is immeasurably better than any which were used near the beginning of the war. Previous to the declaration of war, balloons in military service were almost a nonentity. The tremendous amount of publicity the aeroplane got almost completely overshadowed the silent sausages. Balloons of the spherical type were used for sporting purposes and a few—a very few—observation balloons of the Drachen type were the property of the Army and Navy.

(To be continued)



Royal Naval Air Service Cadets laying out the fabric of a kite balloon of a small dirigible airship previous to inflation with gas. The envelope is laid out evenly on a ground sheet and the rigging attached before the gas is admitted. Behind the cadets can be seen the car and lower portion of the envelope of a "Blimp," the small dirigible airship before referred to. The filling hose, made of rubberized canvas, can be seen attached to the inflation sleeve preparatory to inflation with hydrogen.The car is very much like the body or fuselage of an aeroplane. Two men can be seen standing on the car while they adjust the engine.



This is a Caproni biplane for bombing work. It is equipped with three Liberty motors. This plane was built by the Standard Aircraft Corporation of New Jersey, and first flown on July 4, 1918, at Mineola, L. I., by three Italian officers

AMERICAN CAPRONI MEETS TEST IN AIR

Equipped with Liberty Motors, It Reaches Altitude of 14,000 Feet, Carrying 3,000 Pounds

THE American-built Caproni bi-plane, equipped with Liberty motors, September 21st surpassed expectations of allied officers in the first of a series of altitude, weight-carrying, and speed tests to determine its qualities as a bombing plane. In a flight of an hour the aeroplane reached an altitude of 14,000 feet, carrying three men, gasoline for a five-hour flight, and 1,900 pounds of lead. Allied army officers said they thought the test was extremely successful, and particularly because a brisk wind was blowing throughout the flight.

Captain Ugo d'Annunzio and Lieutenant Julian Parvis, of the Italian Flying Corps, piloted the machine throughout the test, and they were accompanied by Captain H. Harris, an American army officer, who made observations with instruments and kept a record of the flight. The average weight of the men was about 170 pounds, so that the plane was carrying a burden of almost 3,000 pounds.

Major Gen. J. Franklin Bell, commander of the Eastern Department, made an official observation of the flight, and Colonel Brant, of the Department of Military Aeronautics, was delegated by Major General William L. Kenly, in command of the department, to compile a report. With him were Major Martin, Lt.-Col. Rhinehardt and Major Brown. John D. Ryan, Second Assistant Secretary of War, in charge of the aviation program, was represented by J. Gilmore Fletcher, A. A. Landon and William Erb. G. Bevione, head of the Italian mission, with other Italian, French, and Canadian officers, observed the flight so that they could make reports to their aviation departments upon the efficiency of the Caproni as a bombing machine.

Before the official flight 500 cadets from the ground school of the Aviation Section at Princeton University arrived. They were permitted to study the construction of the machine and its engines, and were taken to all the hangars at Hazelhurst Field to examine the De Havilands, the Nieuports, and other planes there.

Much admiration for the performance of the motors was expressed by the allied officers. Other tests for speed will be made within a few days.

The plane, with its sweeping wing-spread of almost 100 feet, and its three Liberty motors, each capable of exerting the energy of 325 horses, averaged 105 miles an hour for one hour and soared to an altitude of 13,500 feet in sixteen minutes.

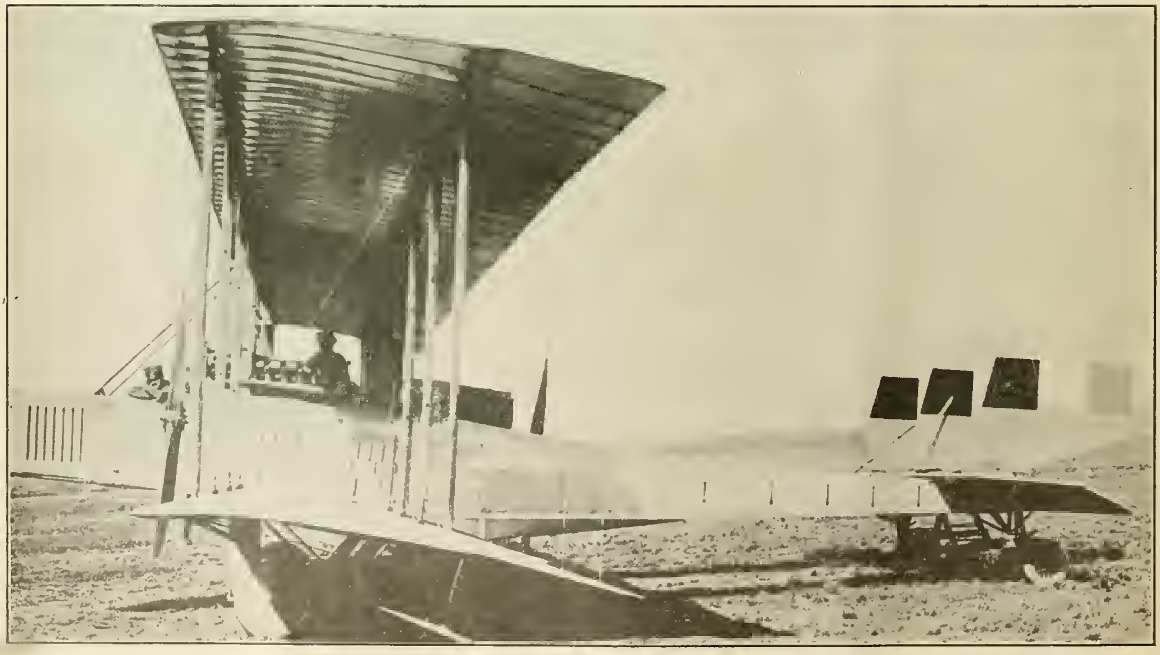
After the tests, over which officials expressed delight, Lieutenant Parvis said he would take up as many present as could crowd into and around the roomy cockpit. Nine clambered in. The biplane rose with them to 10,000 feet with apparently as much ease as when less heavily burdened.

Unofficial witnesses of the flight agreed that no one could mistake its train-like roar for the flight noise of any other flying machine.

Among those present at the tests were Mr. Alan R. Hawley, president of the Aero Club of America; Henry Woodhouse, editor of AERIAL AGE; Captain Robert Bartlett, the famous Artic explorer; Major Falchi, Captain Carlo Tappi, two veteran Italian aviators who participated in the Italian-Turkish war in 1912.

Sir William F. Bailey, president of the Canadian Aeroplanes, Limited, was also present.

Major Barsetta and other officers of the French Aeronautic Mission, including Captain Jacques Boyriven, who flew the last Nieuport and made a speed of 163 miles an hour with the wind—while his disconsolate Boston terrier "Billiken" cried pitifully because he was not taken along. Captain Harris is the officer who piloted the machine that took Major La Guardia from Milan to Rome recently.



"FIRST LIBERTY CAPRONI"

The first of the "Liberty" Caproni biplanes which is being built for army service. The plane is of the famous Italian manufacture with the new American "Liberty" motor installed.

The AIRCRAFT TRADE REVIEW

Aircraft Celebration

More than 5,000 men and women, employes of the Wright-Martin Aircraft Corporation at their Long Island City plant, joined recently in a patriotic demonstration under the direction of the Bureau of Aircraft Production, New York District. The program was directed by Charles E. Mack of the bureau, assisted by E. G. Pratt. The assemblage was in one of the big new buildings, capable of housing nearly 1,000 men at work, which is being completed for the company under special requisitions given by the Government.

A band marched at the head of more than 1;000 men employed as the night shift. Sergeant Ed Doyle of the First Canadian Contingent made an address ,and played his violin to lead the singers. George Houston, president of the Wright-Martin Company, announced that his company has furnished the United States Government with 3,000 motors and that the Government has now made demand for more than three times that number, to be completed before the summer of 1919. Captain A. P. Simmons, formerly of the 18th Regulars, said the workers of the industrial army were as essential as the men in the trenches. Congressman Charles Pope Caldwell of the Second District, who prepared the draft of the bill providing for the $614,000,000 for aircraft production, told of the necessity for rushing supplies needed by the army and the aero squadrons.

Goodyear Gets Aero Mail Letter

F. A. Seiberling, president of the Goodyear Tire & Rubber Company, Akron, Ohio, was among those who received mail carried by aeroplane, on the inaugural trip of the newly-established New York-Cleveland-Chicago Aerial Mail Line. The letter received by Mr. Seiberling was from Mr. Henry Woodhouse, the editor of *Flying*, a leading aeronautical magazine, expressing appreciation of his energetic efforts in hasting the production of aircraft at the Goodyear plant.

Personal Pars.

William B. Stout has resigned his position as technical adviser to the Aircraft Board at Washington and has returned to Detroit to take up the manufacture of a plane of his own design. The experimental work and preliminary construction is being carried out by W. C. Rands, of the Rands Mfg. Co., Detroit.

The following is a list of purchases contracted for by the Bureau of Aircraft Production:

[NOTE.—The first number at the beginning of each paragraph is the Order Number, the second the Contract Number.]

August 9, 1918

30442-18. 2250-2. Wright-Martin Aircraft Corporation, New Brunswick, N. J., spares for 150-horsepower type A Hispano-Suiza engine.

380630. 4453. Curtiss Aeroplane & Motor Corporation, Buffalo, N. Y., hexagon-head bolts with castellated nuts.

710121. 4448. Cherry Lumber Co., Cincinnati, Ohio, 60,000 feet walnut lumber.

710122. 4449. Brown & Harris Lumber Co., Holmesville, Ohio, 50,000 feet walnut lumber.

720116. 4452. West Virginia Aircraft Corporation, Wheeling, W. Va., spares for 500 JN4D training planes: Engine-bed bearers, elevators, rudders, wings, landing gears, etc.

720238. 4441. John A. Roebling's Sons Co., Trenton, N. J., 240,000 feet balloon cable.

720254. 4451. Pyrene Manufacturing Co., care of H. B. Vandergrift, Continental Hotel, Washington, D. C., 5,000 Pyrene fire extinguishers.

720257. 4454. Liberty Iron Works, Sacramento, Cal., spares for 100 JN4D planes: Elevators, vertical fins, landing gears, rudders, wings, etc.

750028. 4450. International Register Co., Chicago, Ill., 3,500 mechanical interrupter gears.

August 13, 1918

20038A10. 1816A. Dayton-Wright Airplane Co., Dayton, Ohio, spares for D.H.4 planes: wings, stabilizer braces, front direct-wire fitting with tie rods.

20038A11. 1816A. Dayton-Wright Airplane Co., Dayton, Ohio, parts for D.H.4 planes: wings, right and left ailerons, elevators rudder, landing gears, etc.

30442-20. 2250-2. Wright-Martin Aircraft Corporation, New Brunswick, N. J., spares for Hispano-Suiza motors; Speedometer shaft and bushing assembly, cotter pins, air pump parts, gaskets, nuts, etc.

320017. 4472. N. C. L. Engineering Corporation, Providence, R. I., 50 N. C. L. windlasses, complete.

320018. 4473. James Cunningham Son & Co., Rochester, N. Y., 25 Cacquot windlasses.

320019. 4474. McKeen Motor Car Co., Omaha, Nebr., 25 Burton windlasses.

480057. 4481. Cleveland Tractor Co., Cleveland, Ohio, 10 standard model H Cleveland tractors.

710115. 4439. Livingston Radiator & Manufacturing Co., New York, N. Y., 541 Handley-Page type radiators.

710129. 4484. Whittaker-Glessner Co., Portsmouth, Ohio, 700 steel drums, 110-gallon capacity.

710131. 4487. Chase Metal Works, Waterbury, Conn., seamless copper tubing.

710132. 4490. Sheffield By-Products Co., New York, N. Y., 40,000 pounds casein.

August 14, 1918

320020. 4482. N. C. L. Engineering Corps, New York, N. Y., 1 N. C. L. kite balloon windlass.

370117. 4493. Gilbert & Barker Manufacturing Co., Springfield, Mass., 10 tanks of 10,200 gallons' capacity each.

380702. 4492. Dobbie Foundry & Machine Co., Niagara Falls, N. Y., 100 No. 21 single-drum hand-power hoists.

380705. 4494. Henry Cheney Hammer Corporation, Little Falls, N. Y., 14,400 hammers.

380706. 4495. Henry Cheney Hammer Corporation, Little Falls, N. Y., 13,150 hammers.

380708. 4498. Collieries Supply & Equipment Co., Philadelphia, Pa., 48 electrical engineers' chests.

450020. 4497. Blaw-Knox Co., Pittsburgh, Pa., furnishing and fabricating necessary structural steel and accessory structural material for the construction of 70 hangars.

450021. 4406. Belmont Iron Works, Philadelphia, Pa., furnishing and fabricating 576 columns (approximately 1,500 pounds each).

710130. 4485. Whittaker-Glessner Co., Portsmouth, Ohio, 1,000 steel drums, 110 gallons' capacity.

70135. 4477. Ayer & McKinney, Philadelphia, Pa., 30,000 pounds casein.

720169. 4488. Standard Aero Corporation of New York, Elizabeth, N. J., 30 E-1 advanced planes constructed to mount Gnome motors.

720190. 4480. Standard Aero Corporation of New York, Elizabeth, N. J., 6 E-1 advanced planes constructed to take LeRhone motors.

720280. 4483. Fedders Manufacturing Co. (Inc.), Buffalo, N. Y., 109 radiators complete, with inlet and outlet connections.

720285. 4496. Hartzell Walnut Propeller Co., Piqua, Ohio, 1,000 wooden air fans.

720290. 4499. Hardman, Peck & Co., New York, N. Y., 500 sets of laminations for Handley Page propellers.

720295. 4501. Parsons Pulp & Lumber Co., Philadelphia, Pa., 4,800,000 feet spruce.

730204. 4500. Dayton Adding Machine & Tire Leek Co., Dayton, Ohio, 1,000 gun synchronizing generators.

730210. 4503. Light Manufacturing & Foundry Co., Pittstown, Pa., spares for OX5 engine, upper and lower crank case, bearing caps.

840041. 4489. Lamb, Finlay & Co., New York City, for services in connection with the handling, paying of duties, and shipping of airplane linens, tapes, and balloon cloths, which are being imported from Great Britain for the Bureau of Aircraft Production.

August 15, 1918

410087. 4505. Louisiana Oxygen Co., New Orleans, La. 500,000 cubic feet hydrogen gas.

710137. 4504. Isaac McLean Sons Co., Dorchester, Boston, Mass., 10,000 feet African mahogany and 25,000 feet Mexican or Central American mahogany.

730198. 4491. Ericsson Manufacturing Co., Buffalo, N. Y., parts for Berling, type D81 magneto (99 items).

780031. 4508. Link Tool & Machine Corporation, New York City, miscellaneous thread gauges to be furnished from time to time.

820017. 4506. Paul Whitin Manufacturing Co., Northbridge, Mass., 25,000 yards cotton airplane fabric.

August 16, 1918.

30442-21. 2250-3. Wright-Martin Aircraft Corporation, New Brunswick, N. J., spares for type 3 engine (43 items).

31072-2. 2250-3. Wright-Martin Aircraft Corporation, New Brunswick, N. J., spares for type 3 engine (43 items).

370124. 4519. Universal Grinding Machine Co., Pittsburg, Mass., 1 No. 2 grinder with C equipment.

710139. 4512. Steward-Hartshorn Co., New York, N. Y., 2,000 sets complete streamline tie rods for D. H. 4 machines.

710140. 4513. Witherow Steel Co., Pittsburgh, Pa., 2,000 sets complete streamline tie rods for D. H. 4 machines.

710141. 4518. Eastman Kodak Co., Rochester, N. Y., 5,000 United States Army unit sights.

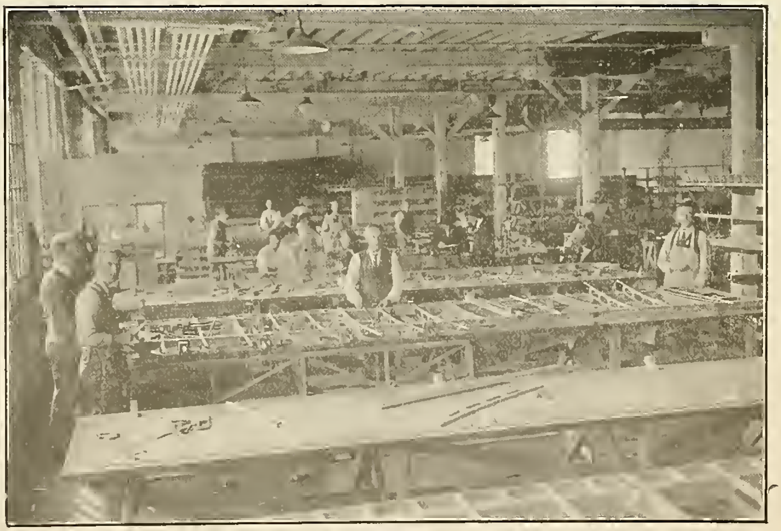
710142. 454. J. V. Stimson & Co., Owensboro, Ky., 50,000 feet walnut lumber.

710143. 4516. Hoosier Veneer Co., Indianapolis, Ind., 500,000 feet walnut lumber.

720233. 4440. Canadian Aeroplane (Ltd.), Toronto, Ontario, Canada, 12 wings for JN4D Canadian planes.

730212. 4515. Disco Manufacturing Co., Detroit, Mich., 3,000 C. C. gun synchronizing generators.

740092, 4517. Wireless Improvement Co., New York City, 1,500 S. C. R., 65 sets.



An interior view of the Springfield Aeroplane Company's plant

THE FUTURE OF THE AIRCRAFT INDUSTRY

By BENJAMIN L. WILLIAMS

THE future of the aircraft industry as outlined by Mr. Henry Woodhouse of the Aero Club of America has been studied with deep interest and, having been actively associated with the Aircraft Manufacturers in peace and war times and with an intimate knowledge of the many difficulties which they have encountered in the production of aircraft in the past, it appears to me that with the extended use of commercial aeroplanes, the furture for the air craft manufacturers is at the dawning.

The most progressive nations in the world have maintained their position by reason of their commercial enterprise and development. In America, this phase of progress has been overshadowed for the moment by our war time activities which have now reached a stage where some consideration can be given to the advantage of commercial development along lines that will assist the war program. The manufacturers who have been sadly handicapped in their business enterprises by a limited market in pre-war times and a restricted market at the present time, will have something to look forward to in the manufacture of commercial aeroplanes, and should now be seriously contemplating "stock products" with a view to actually engaging in commercial work.

With the advent of the Aerial Mail Service as a forerunner of the commercial expansion of the United States and the fact that the Standard Aircraft Corporation of Elizabeth, New Jersey, was the first of the American Aircraft Manufactuerrs to design, construct and deliver aeroplanes, especially for this service, we have conclusive evidence of already having placed the aircraft industry on a commercial basis; it being reasonable to predict that what one company has accomplished, as a pioneer in the commercial field, that other similar organizations can do also, and more easily now that the way has been opened for them.

The United States is depended upon by the civilized world to support the conduct of the war and, it is obvious that the commercial expansion within our own borders should concurrently parallel our war work in order that it, too, may be efficient.

Italy has numerous air routes in daily operation for mail, express and contact service with her air forces, using the Caproni type of machine flown on schedule time and covering practically every part of the country. This type of machine has been duplicated in America and successfully flown at its first trial.

France was highly active in the development of the high speed aeroplanes and has always been at the front in the progressive science of aeronautics.

England has astonished the world by the size of her aircraft, the great weights carried and the long distances that they have traveled in order to render a service urgently needed.

Austria has already established Aerial Mail routes and is employing them as means of close communication between strategic points, thus relieving the railway and wire service.

Germany has copied the English Handley Page type of machines which are now made in America and has in the past been extremely active in the commercial development of the air service.

America's opportunity to establish a commercial air service will never be more advantageous. Her manufacturers have been able to successfully reproduce the leading types of aircraft of England, France and Italy and at the first trial, the flights of these machines have been successful. The past three years' experience of the countries have established a fund of accurate information relating to aircraft design and service upon which we can draw, and, by the experiences of the friendly nations, we will be able to pass rapidly through the difficult pioneer period without loss of time or energy due to experimentation with a hitherto unknown quantity.

Within the next six months, many additional routes for mail carrying should be in active operation. The equipment necessary to carry out this work can fairly be expected to be released from the war work, since commercial aeroplanes will aid materially the war program in securing a closer contact with bases of supplies in this country and shortening the time of communication between manufacturing and administrative centres.

It has already been demonstrated that the manufacturers can build the commercial type of aeroplanes in rapid time and fly them from their factories and from the performances of the Aerial Mail Service, it is evident also that commercial aeroplanes can be economically operated, and on a business basis.

To adequately prepare for the commercial expansion of the future, it is now opportune for the Government to release for this service raw materials in sufficient quantities to construct the commercial aeroplanes and to permitt he aeroplane manufacturers to divert a part of the present organization to commercial use and to utilize their war experience, in order to meet the demands that will be made upon them in the commercial field.

However rapid the future developments of the commercial Aerial Service may take place, the aircraft manufacturers and the allied industries can be relied upon to meet its requirements and with their co-operation and by their coordination of effort, now already completely established by reason of the war, will be able to take an active part in placing America in the foremost ranks of the civilized nations and maintain that supremacy through the intensive development of peaceful pursuits.

THE ZEPPELIN BOMBING BIPLANE

THROUGH the courtesy of *L'Aerophile* we are enabled to present outline drawings of the large Zeppelin bombing machine which was brought down on the Western Front south-east of Soissons. It is equipped with four Maybach engines delivering a total of 1200 horsepower. Each motor is independent. All are placed at the same level and in pairs. They are set up one behind the other. The front ones are tractors and the rear ones are pushers. Being of the same type they revolve in opposite directions because of this, thereby neutralizing the torque. The same idea was advanced and tried out in France in 1916. Each motor is placed between the two legs of the cockpit AR and AV. Half of the length on the motor is placed behind these legs and half ahead of them. Each of the platforms to which they are bolted is a beam made of two pieces of wood with a small strip laid in between vertically.

The fuselage, as in the smaller types, is unique. It shows the general characteristics of the old German fuselage, and not as the new ones which have wooden frames. The length is 21 meters, 35 centimeters.

Ailerons

As on all German biplanes except the Albatros C.X. and Friedrichhafen types this machine does not have ailerons on the upper wings. Although the third longeron has a shape like a gutter to receive it it is a matter of certain fact that the third longeron is not used as a bearing and the machine does not have ailerons on the lower wings.

The total wing spread is 41 meters, while the total length is 22 meters.

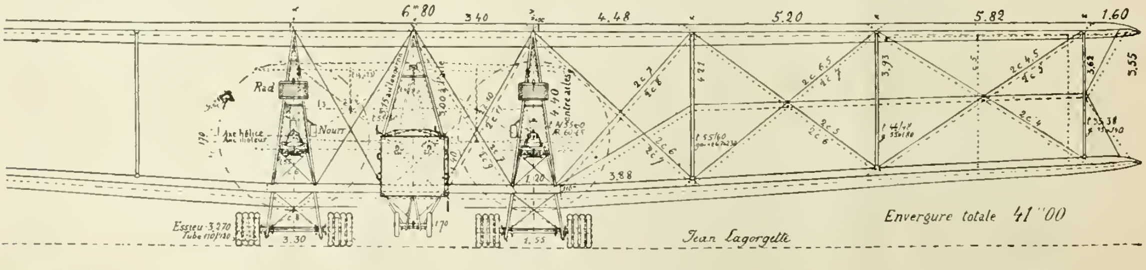
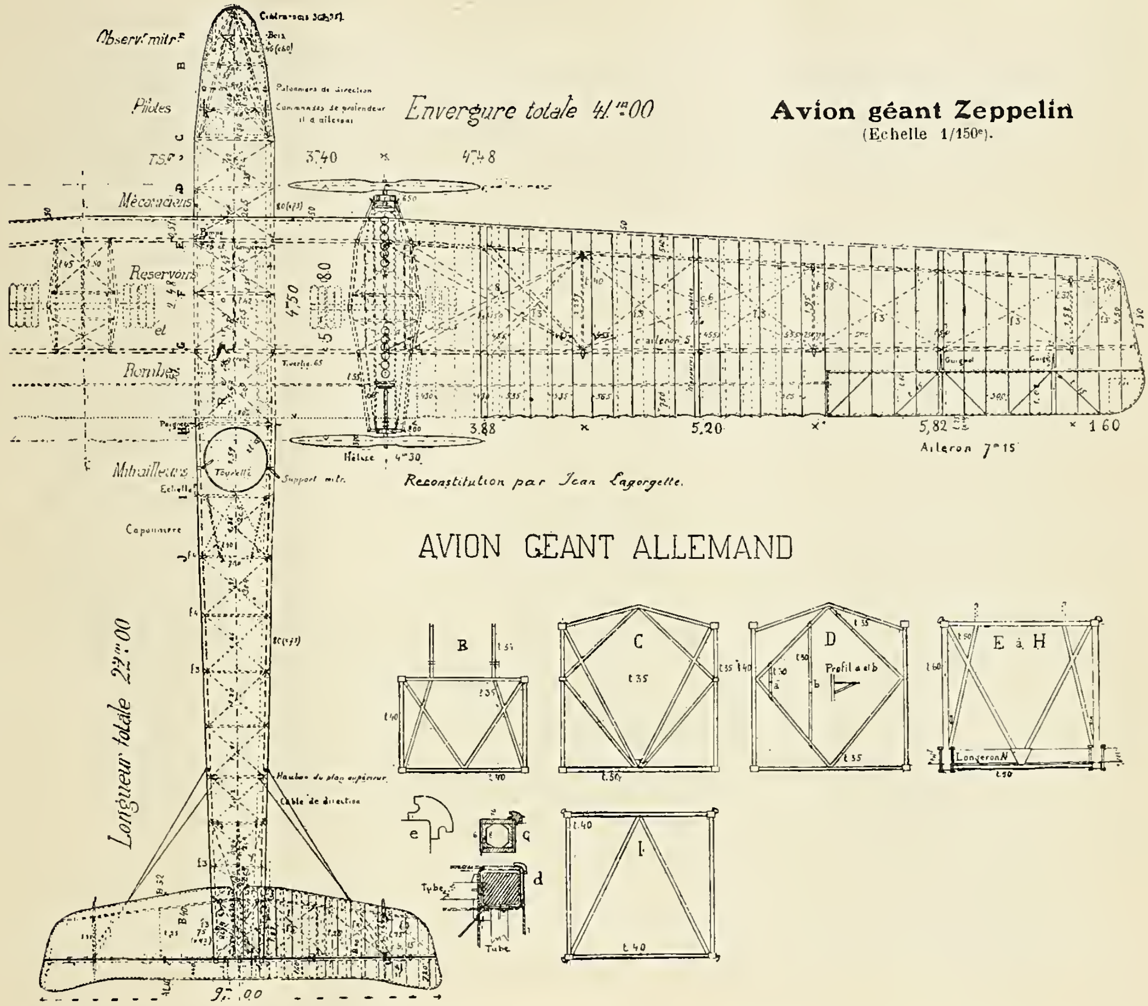


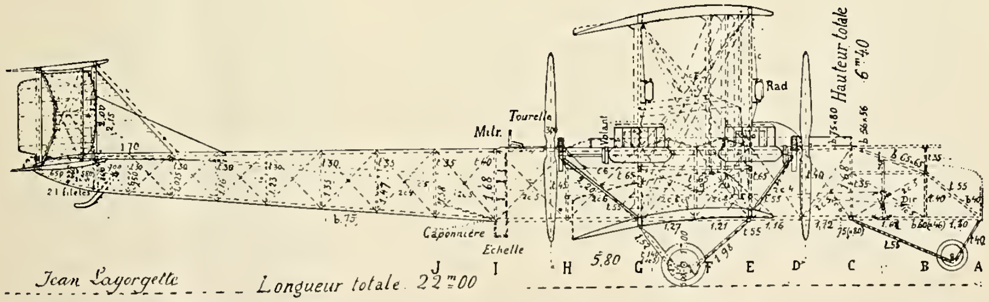
FIG. 3 et 4. — **Avion géant Zeppelin.** — Echelle 1/150e. — *al.* duralumin: *b.* bois: *c.* câble; *f.* fil d'acier; *g.* gaine; *t.* tube. — Vue de face des tirets indiquent le dessous du longeron A R, son haubannage, ainsi que les gouvernes.

GIANT ZEPPELIN AEROPLANE

al—duralumin; b—wood; c—cable; f—steel cable; g—sbeath; t—tubing.

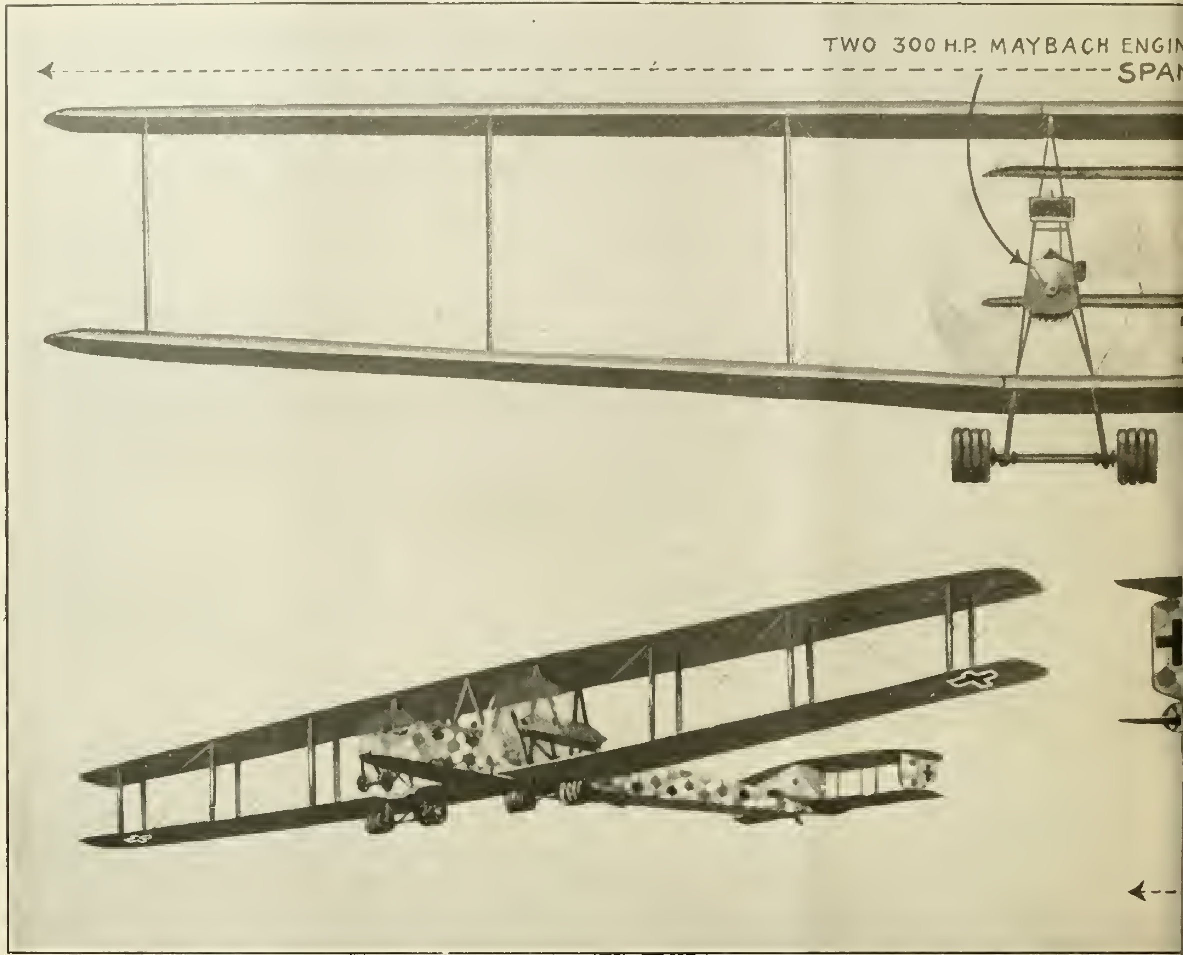


The ribs of the lower wings and lower elevators are shown in dotted lines, also the rudders. To the left and out of the fuselage figures three and four show the diameter of the transversal struts. The upper wings are in reality 45cm. out of center. B and I are transversal frames. In G frame the wing longeron is placed somewhat underneatb the position it occupies in E and it replaces the tube cross bracing above frames E to H. The dotted lines indicate longitudinal beams. c is the sectional longeron of the fuselage. e is a section of the corner angle of the fuselage in the angle of the longeron



A side view of the Zeppelin Bomber. Tbe upper wings are really out of center at the rear about 45 cm. The angle of incidence is such that the struts are at right angles to the chord. The propeller and motors are about 12 cm. back. The ribs of the central section are extended into the legs of AR of the cockpit. There are two elevators in similar directions and the central section comprises a large triangle besides the lateral planes, the inside apex of which forms a semi-ellipse. The parts B-A in the sketch may be taken to pieces without spoiling the main part of the machine

THE NEW FOUR-MOT



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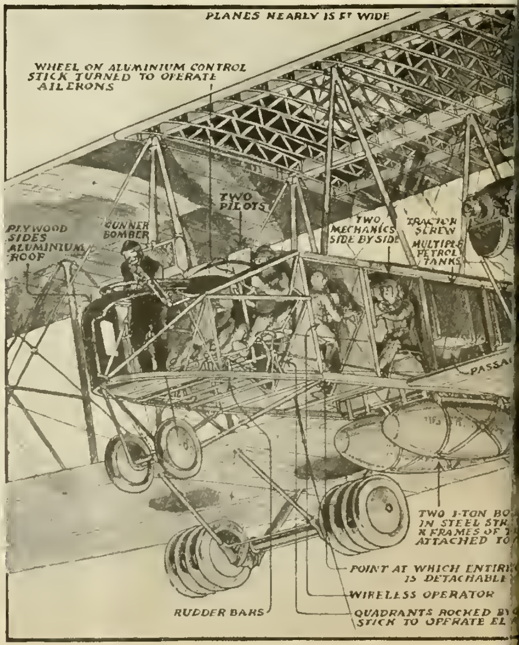
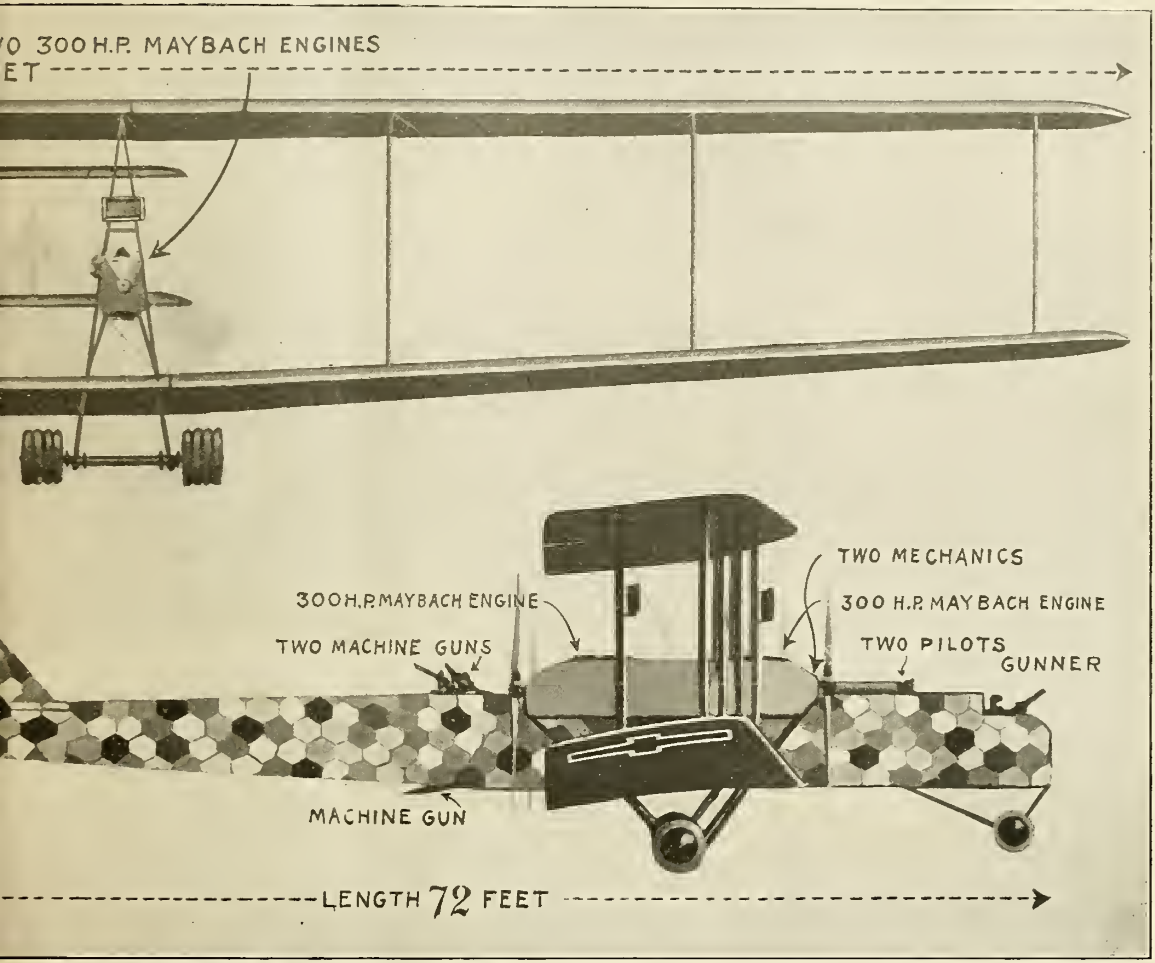
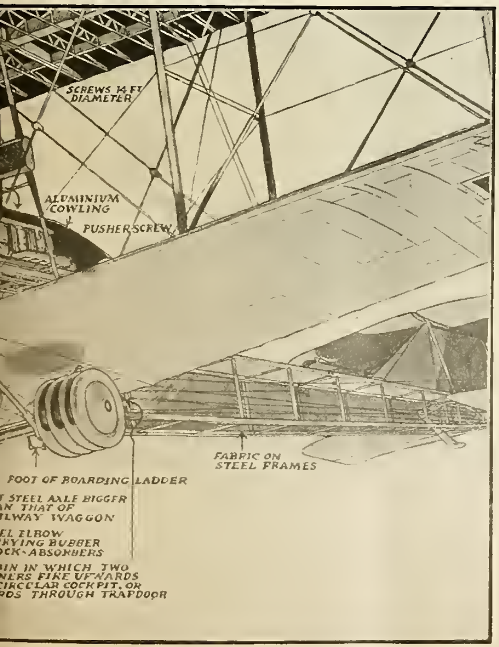

PLANES NEARLY 15 FT WIDE
WHEEL ON ALUMINIUM CONTROL STICK TURNED TO OPERATE AILERONS
TWO PILOTS
PLYWOOD SIDES ALUMINIUM ROOF
GUNNER BOMBER
TWO MECHANICS SIDE BY SIDE
TRACTOR SCREW
MULTIPLE PETROL TANKS
PASSA
TWO 1-TON BO IN STEEL STR X FRAMES OF T ATTACHED TO
POINT AT WHICH ENTIR IS DETACHABLE
WIRELESS OPERATOR
RUDDER BARS
QUADRANTS ROCKED BY STICK TO OPERATE EL

ZEPPELIN BOMBER




SCREWS 14 FT DIAMETER
ALUMINIUM COWLING
PUSHER SCREW
FABRIC ON STEEL FRAMES
FOOT OF BOARDING LADDER
STEEL AXLE BIGGER AN THAT OF ILWAY WAGGON
EL ELBOW RYING RUBBER OCK-ABSORBERS
BIN IN WHICH TWO NERS FIRE UPWARDS CIRCULAR COCKPIT, OR RDS THROUGH TRAPDOOR

THE NEW GERMAN AEROPLANES

A despatch from the British front in France reports the appearance in a bombing raid over the Allied line in the St. Quentin sector of a number of German aeroplanes of huge size, carrying bombs "thirteen feet long, which contained 2,000 pounds of explosives." This is evidently the new Zeppelin bomber to which the German military authorities referred in connection with their plans for the building of "monster submarines" and giant long-distance guns, and which is illustrated herewith.

THERMODYNAMIC CYCLES IN INTERNAL COMBUSTION ENGINES

With Particular Reference to Aircraft Requirements

By WM. J. WALKER, B. Sc., A. M. I. C. E.

(*With twelve line illustrations*)

SIR DUGALD CLERK, in a recent paper,* gave it as his opinion that "British engineers and scientific men are still convinced that other methods must be found of increasing power in internal combustion engines than mere increase of dimensions of cylinders and massive construction of parts as practised in Germany." The recent paper on "The Possibilities of the Constant Pressure Cycle" read before the Society of Automobile Engineers of America, and printed in the July, 1916, number of *The Automobile Engineer*, is evidence of the prevailing feeling that a *cul de sac* is being approached, although, perhaps, the direction indicated by the authors of the paper in question would appear to lead to nothing more than another such blind alley in a much less prosperous neighborhood.

The three most obvious methods by which increase of power may be obtained are:

(1.) An increase of the mean effective pressure of the cycle.

(2.) An increase of engine speed.

(3.) An increase of the number of working strokes per revolution.

The second of these, perhaps, has not been so fully utilized as it might be, but its limitations are certainly well recognized. The third is typified by the many endeavors to produce a successful two-stroke motor. It is upon the first method of obtaining increased power that the main ideas of the following notes are based. For the purpose of this investigation thermodynamic cycles will be divided into two main classes, designated types A and B.

The Dual Combustion Cycle, Type A

This is shown graphically in fig. 1. It will be noticed that part of the heat of combustion is developed first at constant volume, and the remainder at constant pressure, hence the term "dual combustion." All the heat rejected is rejected at constant volume. The best example of an engine operating successfully on this cycle is the Blackstone heavy oil engine.

In fig. 1,

Let r = compression ratio = $\frac{v}{v_0}$.

ρ = cut-off ratio = $\frac{v_2}{v_1}$

α = explosion ratio = $\frac{p_1}{p_0}$

and γ = the adiabatic constant = (1.4 for air).

The efficiency of the cycle is then given by

$$1 = \frac{1}{r^{r-1}} \left(\frac{\alpha \rho^r - 1}{(\alpha - 1 + \gamma \alpha (\rho - 1)} \right) \quad (1)$$

If $\rho = 1$, the expression (1) gives the efficiency of the constant volume cycle in its well-known form:

$$\eta t = 1 - \frac{1}{r^{r-1}}$$

If $\alpha = 1$, (1) gives the expression for the cycle on which the Diesel engine operates, *i.e.*,

$$\eta t = 1 - \frac{1}{r^{r-1}} \left(\frac{\rho^r - 1}{\gamma (\rho - 1)} \right)$$

The mean effective pressure of Type A is given by

$$p_m - \eta t\ p \left(\frac{r^r (\alpha - 1) + \gamma \alpha (\rho - 1)}{(r - 1)(\gamma - 1)} \right) \quad (2)$$

where p is the pressure at the beginning of compression.

If $\rho = 1$, this gives for the mean effective pressure of the constant volume cycle

$$p_m = \eta t\ p \frac{r^r (\alpha - 1)}{(r - 1)(\gamma - 1)}$$

If $\alpha = 1$, as in the Diesel cycle, then

$$p_m = \eta t\ p \frac{\gamma r^r (\rho - 1)}{(r - 1)(\gamma - 1)}$$

The convenience and simplicity of the expressions thus obtained for calculating the thermal efficiency and mean effective pressure for different values of p, α, and r are apparent, since *temperature values* are entirely eliminated.

The Dual Combustion Cycle, Type B

This is shown graphically in fig. 2. It is similar to type A, except that the heat is rejected at constant pressure instead of constnat volume. There is no internal combustion engine of any kind of which the writer is aware which operates on this cycle. It is introduced here because of many interesting points which are revealed by examination of the cycle from a thermodynamic standpoint. This interest is not merely because of the theoretical points which will appear, but also because of its practical bearing on the subjects of complete expansion and compounding for internal combustion engines. It is, of course, obvious that this cycle must have a lower mean effective pressure than the one previously discussed.

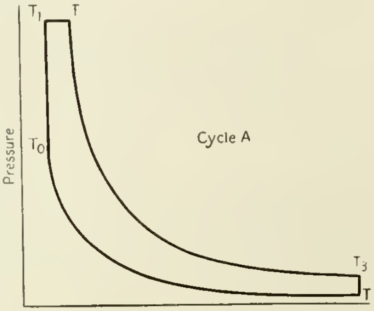


Fig. 1.

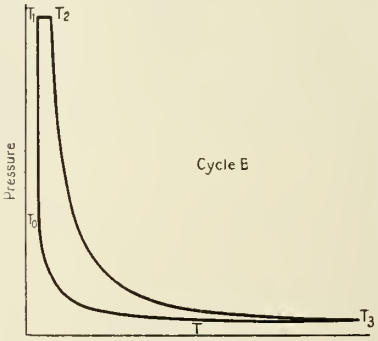


Fig. 2.

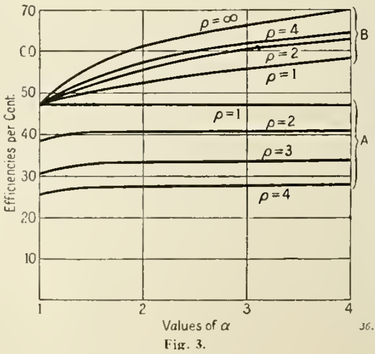


Fig. 3.

The thermal efficiency of the cycle is given by

$$\eta t = 1 - \frac{1}{r^r - 1} \left(\frac{\gamma (\alpha^{\frac{1}{r}} \rho - 1)}{(\alpha - 1) + \gamma \alpha (\rho - 1)} \right) \quad (3)$$

If $a = 1$, (3) becomes the expression for the constant pressure cycle, which, as is well-known, is the same as for the constant volume cycle, *i.e.*,

$$\eta t = 1 - \frac{1}{r^r - 1}$$

If $p = 1$, the efficiency is

$$\eta t = 1 - \frac{1}{r^{r-1}} \frac{\gamma a^{\frac{1}{r}} - 1}{a - 1} \left(\frac{\gamma \alpha^{\frac{1}{r}} - 1}{\alpha - 1} \right)$$

This example of type B (*i.e.*, when $p = 1$) is the cycle designated type 3 by Clerk in his book "The Gas, Petrol, and Oil Engine."* The expression for the efficiency given there is

$$\eta t = 1 - \gamma \frac{T' - t}{T - t_r}$$

and involves four different temperatures in the cycle. This is pointed out to indicate the advantage of casting the expressions into the forms given here, temperature values not being involved.

The mean effective pressure of type B is given by

$$p_m = \eta_t p r^r \left(\frac{(\alpha - 1) + \gamma \alpha (\rho - 1)}{(\alpha^{\frac{1}{r}} \rho r - 1)(\gamma - 1)} \right) \quad (4)$$

which, for the constant pressure cycle with $\alpha = 1$, becomes

$$p_m = \eta_t p r^r \frac{\gamma\ \rho - 1)}{(pr - 1)(\gamma - 1)}$$

For $\rho = 1$

$$p_m = \eta_t p r^r \left(\frac{\alpha - 1}{(\alpha^{\frac{1}{r}} - 1)(\gamma - 1)} \right)$$

Comparison of Types A and B

From the formulæ (1) to (4) thus obtained, the thermal efficiencies and mean effective pressures in types A and B have been plotted in figs. 3 to 6 against values of α and ρ and on the basis of a compression ratio $r = 5$, γ being assumed = 1.4. The conclusions to be arrived at will clearly be quite independent of the values thus arbitrarily chosen. Figs 3 and 4 show the variation of thermal efficiency of the two cycles with α and ρ, while figs. 5 and 6 show the variation of mean effective pressure with the same quantities.

The first point to be noted is that the efficiency of type A increases with an increase of α, representing constant volume combustion, but is diminisbed by an increase of ρ, representing constant pressure combustion. In type B the efficiency increases with both α and ρ. This difference in the effect of constant pressure combustion upon the efficiencies of the two types is interesting. A glance at figs. 5 and 6 shows that, as far as mean effective pressures are concerned, type A has all the advantages.

For purposes of comparison, four particular cases of the two types of cycle will now be investigated, each with the same maximum pressure of 545 lb. per sq. in. All the cases are represented in fig. 7.

CASE 1.—This is an example of type B with $r = 1$, $\rho = 2$, and $\alpha = 36.3$, and is represented by the area FABCF. Its efficiency $\eta_t = 59.3\%$.

CASE 2.—Type B with $r = 13$, $\rho = 2$, and $\alpha = 1$. This is represented by the area FEBCF. Its efficiency $\eta_t = 64.1\%$.

CASE 3.—Type A with $r = 13$, $\rho = 2$, and $\alpha = 1$. This is represented by the area EBCDE, and is an example of the cycle on which the Diesel engine is operated. Its efficiency $\eta_t = 58.2\%$.

Attention is drawn here to the fact that the difference in efficiency between cases 2 and 3 is 5.9%, expressed as a percentage of the total heat supplied. This will be observed to be due entirely to the difference between the work areas in the two cases represented by the area DEF in fig. 7.

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* *Journal of the Royal Society of Arts*, December, 1916.

CASE 4.—The same as case 1, with the omission of the area DEF. Its efficiency η_t = 55.5%.

Comparing the two cases 3 and 4, it appears that from $r = 1$ to $r = 13$ the difference in efficiencies is only 2.7%.

The relative possibilities of operating these cycles in practice have no bearing on the argument which follows.

The important point to be noted is the relative value of the area DEF to the total work obtained. It is evident that the smaller the compression ratio r, the less will be the relative value of the area DEF to the whole area. It is for this reason that the diminution in efficiency between cases 3 and 4, where $r = 13$ and $r = 1$ respectively, is only 2.7%. In such a cycle, therefore, the compression ratio would be chosen, not at all from the point of view of efficiency to be obtained, but from its likely effect upon the reliable working of the engine. In other words, *although increase of compression ratio generally increases the efficiency of any cycle, some other portion of the cycle (such as the constant pressure combustion process in type B) may exert such an influence as to render the effect of compression ratio upon the efficiency negligible.*

It is usual to look upon compression ratio as the theoretical limiting factor in the attainment of a high efficiency. This is partly a contradiction of the old scientific principle deduced from Carnot's cycle—that efficiency depends upon wide temperature limits. The fact that both principles are true under the assumptions proper to each evidently indicates that there must be some compromise between them. Such a compromise is indicated in type B, where the advantages of both principles may be retained without the intervention of the disadvantages due to too extreme an application of either.

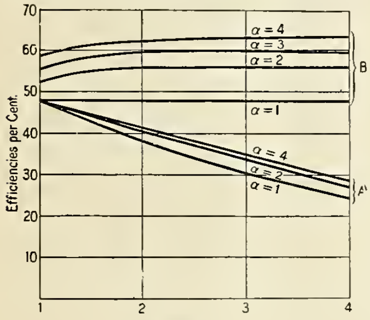

Fig. 4.

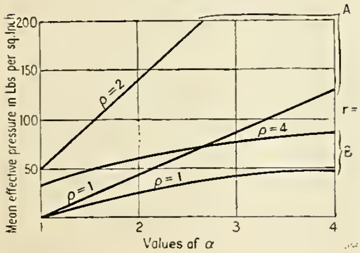

Fig. 5.

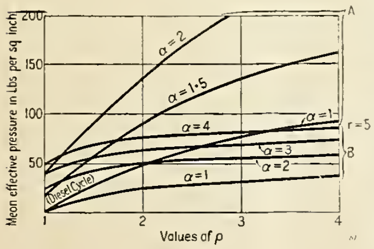

Fig. 6.

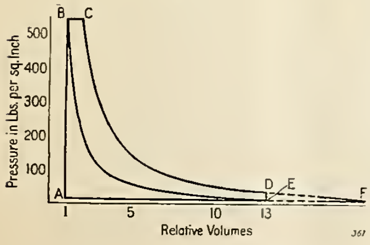

Fig. 7.

For the purpose of considering these types further with regard to their application to aero engines, the power requirements of aeroplanes will be dealt with briefly.

Power Required for Flight

In order to obviate the necessity of going into a close investigation of the theoretical aspect of this question, the writer has constructed a series of graphs calculated from reliable data. The graphs are based upon the requirements of two areoplanes of equal total weight but of different wing loadings, the two values chosen for the latter being 8.5 and 4.7 lb. per sq. ft. of wing area. The ratio of *supporting area* A to the *equivalent normal* area a is assumed to be = 60. The first graph is shown in fig. 8, which gives the thrust-speed relationship for the two machines during horizontal flight, showing minimum thrust values at speeds of 83.5 and 107.5 miles per hour. These are evidently the speeds which give the *least fuel consumption for flights of given range,* or the *least energy speeds.* Fig. 9 shows the corresponding power speed graphs. These indicate at a glance the difference between the power requirements of heavily and lightly loaded machines. At high speeds the power required by the lightly loaded machine becomes excessive, and the reason for this is obvious. Both machines have the same total overall weight of 2,210 lb., so that the lightly loaded machine, presenting, as it does, a large surface area to the wind currents, will experience, while attaining the higher speeds, a rapidly increasing head and skin resistance which will eventually cause an absorption of power largely in excess of what would be required to propel the heavily loaded machine of the same total overall weight. Minimum power is required in the two cases at speeds of 61 and 81 miles per hour with the light and heavy loading respectively. These are the speeds which give *least fuel consumption for flights* of given duration of time, or *least power speeds.*

Adaptability of Power Available to Power Required

In fig. 10 is shown in the full line graph, convex upwards, a characteristic power curve of an engine and propeller plant, while the other full line curve, concave upwards, is the power speed graph of the machine whose loading is 4.7 lb. per sq. ft., derived from fig. 9. Fig. 11 gives the same engine power graph in conjunction with the required power graph of the machine whose loading is 8.5 lb. per sq. ft.

At first sight it would seem that the lightly loaded machine appears to lend itself to a slightly wider range of flying speeds with a given power unit than is possible with the heavily loaded machine. The difference in this respect between the two cases chosen is given by the ranges comprised between the vertical dotted lines in each case. On the other hand, however, referring first to fig. 10, the limiting speeds there of 59 and 107 miles per hour correspond at that particular loading to angles of incidence of 6.6° to 2°, the lower limiting angle being therefore beyond the generally accepted danger limit of 3°. In order to bring the whole macihne within safe limits of operation, a smaller powered motor is necessary, or else the pilot, if he wishes to attain the horizontal speed of 90 miles per hour, which corresponds in this case to the limiting angle of 3°, must perform the double operation of opening the throttle and setting the angle of incidence of his machine to suit. If a smaller powered motor is installed, the inclusion of the characteristic power speed graph of such a system shown dotted in fig. 10 reveals how the speed range has been reduced when the intersecting point of the two graphs at the higher speed corresponds to the limiting safe angle of incidence. In fig. 11, again, the limiting speeds of horizontal flight there are about 73 and 114 miles per hour, corresponding to angles of incidence of 3½° to 8°, both within safe limits. Hence, in this case, a higher powered motor can be safely installed such as that, the power speed graph of which is represented by the dotted line, giving the much wider speed range shown. The crosses in figs. 10 and 11 indicate the position of the least energy speeds, and it is obvious that the intersecting point of the two graphs at the higher speeds should be at, or as nearly as possible to, this value, so that the normal speed of the aeroplane, with the engine at full power, will take place, as nearly as possible, under the least energy conditions. This condition is more nearly met by the heavily loaded machine. It may be argued that a more favorable correspondence between the available and required power of the lightly loaded machine could be obtained than has been depicted here in fig. 10. On the whole, howveer, it will be found that the balance of advantage in this respect lies with the heavily loaded machine.

Types A and B in Their Relation to Adaptability

Although it is absolutely necessary to obtain the minimum of weight in all parts of the structure which go to make up an aeroplane, it does not necessarily follow that, in the case of the power unit, the engine working on a cycle with the greatest mean effective pressure is to be preferred without qualification. The question of efficiency intervenes to upset such a notion, and it is quite clear that in any case of prolonged flight, such as the Transatlantic project, the efficiency must easily play the predominating part. For machines whose sole purpose is quick climbing during short flights only, an engine with a high mean effective pressure is essential. From these two extreme cases it is evident that there is much room for compromise, and this compromise may be stated in terms of the relation between engine weight and efficiency, as has been done already by the writer in another place. This

(*Continued on page* 142)

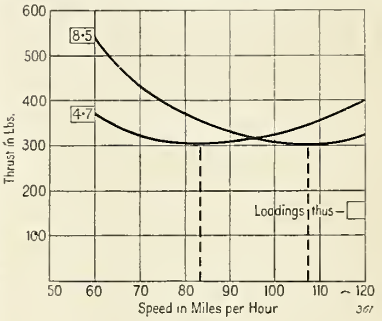

Fig. 8.

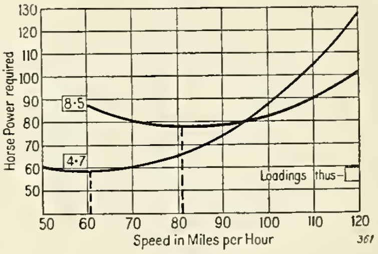

Fig. 9.

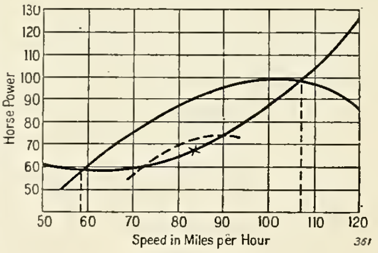

Fig. 10.

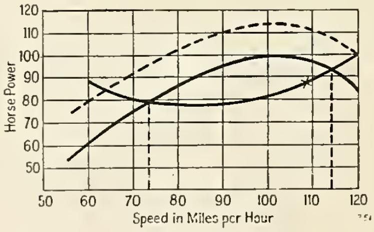

Fig. 11.

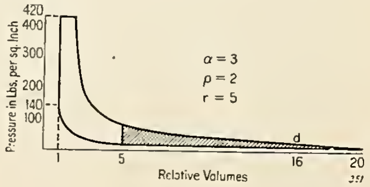

Fig. 12.

THIRD ANNUAL REPORT OF THE NATIONAL ADVISORY COMMITTEE ON AERONAUTICS

IN accordance with the provisions of the act of Congress approved March 3, 1915, establishing the National Advisory Committee for Aeronautics, the committee submits herewith its third annual report.

This report reviews the activities of the committee during the past year, the work accomplished in the study of scientific problems, the assistance rendered by the committee in connection with aerial preparedness for war and in the development of the aircraft industry to meet the demands of the Government, and contains a statement of expenditures, estimates for the fiscal year 1919, and certain recommendations for the consideration of Congress. Technical reports covering the various subjects under investigation during the past year are submitted as appendixes.

The National Advisory Committee for Aeronautics

The National Advisory Committee for Aeronautics was established by Congress by act approved March 3, 1915. Under the law the committee is charged with the supervision and direction of the scientific study of the problems of flight with a view to their practical solution, the determination of the problems which should be experimentally attacked, their investigation and application to practical aeronautics. The committee is also authorized to direct and conduct research and experiment in aeronautics in such laboratory or laboratories, either in whole or in part, as may be placed under its direction.

The committee has 12 members appointed by the President. As authorized by Congress, the personnel of the committee consists of 2 members from the War Department, from the office in charge of military aeronautics; 2 members from the Navy Department, from the office in charge of naval aeronautics; a representative each of the Smithsonian Institution, of the United States Weather Bureau, and of the United States Bureau of Standards; and not more than 5 additional persons acquainted with the needs of aeronautical science, either civil or military, or skilled in aeronautical engineering or its allied sciences.

During the past year the two naval members of the committee, Capt. Mark L. Bristol, United States Navy, and Naval Constructor Holden C. Richardson, United States Navy, the latter being also secretary of the committee, resigned on account of transfer to duty away from Washington; and Brig. Gen. George B. Scriven, United States Army, resigned on account of retirement. To fill the vacancies thus occasioned, the President appointed the following members: Rear Admiral D. W. Taylor, Chief Constructor, United States Navy; Lieut. Commander J. H. Towers, United States Navy; and Lieut. Col V. E. Clark, Signal Corps. Dr. S. W. Stratton succeeded Naval Constructor Richardson as secretary.

The organization of the Advisory Committee as of October 4, 1917, the date of the annual meeting, is as follows:

Dr. William F. Durand, chairman.
Dr. S. W. Stratton, secretary.
Dr. Charles D. Walcott, chairman, executive committee.
Dr. Joseph S. Ames.
Lieut. Col. V. E. Clark, United States Army.
Prof. John F. Hayford.
Prof. Charles F. Marvin.
Hon. Byron R. Newton.
Dr. Michael I. Pupin.
Maj. Gen. George O. Squier, United States Army.
Rear Admiral David W. Taylor, United States Navy.
Lieut. Commander John H. Towers, United States Navy.

The annual meetings of the Advisory Committee are held in October and the semi-annual meetings in April. The present report includes the activities of the committee between the annual meeting held on October 5, 1916, and that held on October 4. 1917.

Amendments to Regulations

At the semi-annual meeting on April 19, 1917, the regulations were amended to provide:

> That the secretary be not ex-officio member and secretary of the executive committee as had formerly been the case, but that the executive committee elect its secretary by ballot to serve for one year.
>
> That the executive committee, in addition to the seven members elected by ballot, should include further any member of the Advisory Committee not otherwise a member of the executive committee but resident in or near Washington and giving his time wholly or chiefly to the special work of the committee.
>
> That the members and employees of the Advisory Committee and of all sub-committees may be allowed traveling expenses and $4 per diem in lieu of subsistence while traveling under orders of the committee on official business.
>
> That the executive committee shall appoint a special disbursing agent for such funds as may be appropriated for the use of the Advisory Committee and that the chairman, or acting chairman, of the executive committee shall approve all accounts for the disbursement of funds.
>
> That amendments may be made by a two-thirds vote by letter ballot or at a special meeting, subject to approval by the President, and need not necessarily wait upon stated meetings for consideration.

The Executive Committee

For carrying out the work of the Advisory Committee the regulations provide for the election annually of an executive committee, to consist of seven members, and to include further any member of the Advisory Committee not otherwise a member of the executive committee, but resident in or near Washington and giving his time wholly or chiefly to the special work of the committee. The executive committee, as organized on October 9, 1917, is as follows:

Dr. Charles D. Walcott; chairman, Secretary, Smithsonian Institution.
Dr. S. W. Stratton, secretary, Director, Bureau of Standards.
Dr. Joseph S. Ames, physicist, Johns Hopkins University.
Prof. Charles F. Marvin, Chief, United States Weather Bureau.
Dr. Michael I. Pupin, physicist and electrical engineer, Columbia University.
Maj. General George O. Squier, Chief Signal Officer, United States Army.
Rear Admiral D. W. Taylor, Chief Constructor, United States Navy.
Dr. W. F. Durand, chairman, National Advisory Committee for Aeronautics, additional member.

The executive committee, in accordance with the general instructions of the Advisory Committee, controls the administration of the affairs of the committee and exercises general supervision over all arrangements for research and other matters undertaken or promoted by the Advisory Committee. It keeps written records of all transactions and expenditures and submits an annual report to the Advisory Committee, the details of which furnish the material for the present report.

The executive committee held regular monthly meetings throughout the year, and in addition, held 13 special meetings on the following dates:

Regular meetings.—October 12, 1916; November 9, 1916; December 7, 1916; January 11, 1917; February 10, 1917; March 8. 1917; April 12, 1917; May 10, 1917; June 14, 1917; July 12, 1917; August 9, 1917; September 13, 1917.

Special meetings.—October 9, 1916; November 23, 1916; February 1, 1917; February 3, 1917; February 4, 1917; March 22, 1917; March 29, 1917; April 5, 1917; April 10, 1917; April 23, 1917; May 26, 1917; September 27, 1917; October 2, 1917.

The committee has organized the necessary small clerical and technical staffs. All work is performed under the personal supervision of one or more officers of the committee. An assistant secretary, who also serves as special disbursing agent, has charge of the office, records, and property of the committee.

Subcommittees

The following subcommittees organized under the executive committee have greatly facilitated the work of the committee during the past year. Under proovision of the regulations for the conduct of the work of the committee the membership of subcommittees is not limited to members of the Advisory Committee. The committees marked with an asterisk have been superseded or discharged:

*AERIAL MAIL SERVICE:
Maj. Gen. George O. Squier, United States Army, chairman.
Prof. Charles F. Marvin.
Dr. S. W. Stratton.
Lieut. Col. V. E. Clark, United States Army
Lieut. Commander J. H. Towers, United States Navy.

AERO TORPEDOES:
Lieut. Commander J. H. Towers, United States Navy, chairman.
Lieut, Col. V. E. Clark, United States Army.

AIRCRAFT COMMUNICATIONS:
Dr. Michael I. Pupin, chairman.
Dr. Joseph S. Ames.
Dr. S. W. Stratton.
Dr. E. B. Rosa.

AEROPLANE MAPPING COMMITTEE:
Maj. Gen. George O. Squier, United States Army, chairman.
Dr. Charles D. Walcott.
Capt. J. W. Bagley, Engineer Officers' Reserve Corps.
Carl G. Fisher.

BIBLIOGRAPHY OF AERONAUTICSS
Prof. Charles F. Marvin chairman.
Dr. Joseph S. Ames.

BUILDINGS, LABORATORIES, AND EQUIPMENT:
Dr. S. W. Stratton, chairman.
Dr. Joseph S. Ames.
Dr. W. F. Durand.
Lieut. Col. V. E. Clark, United States Army.
Lieut. Commander J. H. Towers, United States Navy.

CIVIL AERIAL TRANSPORT:
Dr. W. F. Durand, chairman.
Dr. S. W. Stratton.
Prof. Charles F. Marvin.
Lieut. Col. V. E. Clark, United States Army.
Lieut. Commander J. H. Towers, United States Navy.

DESIGN, CONSTRUCTION, AND NAVIGATION OF AIRCRAFT:
Maj. Gen. George O. Squier, United States Army, chairman.
Dr. Joseph S. Ames.
Lieut. Commander J. H. Towers, United States Navy.
Lieut. Col. V. E. Clark, United States Army.
Dr. A. F. Zahm, secretary.
Frederick Alger.
M. D. Hersey.
J. H. Nelson.
Aeronautic instruments—
  Dr. Joseph S. Ames, chairman.
  Commander W. T. Jewell, United States Navy.
  M. D. Hersey.
  Maj. C. E. Mendenhall, Signal Corps.
  Dr. Lyman Briggs.

EDITORIAL:
Dr. Joseph S. Ames, chairman.
Dr. S. W. Stratton.
Dr. W. F. Durand.

*FOREIGN REPRESENTATIVES:
Dr. Charles D. Walcott, chairman.
Maj. Gen. George O. Squier, United States Army.
Rear Admiral D. W. Taylor, United States Navy.

FREE FLIGHT TESTS:
Prof. John F. Hayford, chairman.
Dr. W. F. Durand.
Dr. S. W. Stratton.
Lieut. Col. V. E. Clark, United States Army.
Prof. A. Klemin.
Dr. Lyman Briggs.
Dr. A. F. Zahm.
Lieut. G. P. Thomson, R. F. C.

GOVERNMENTAL RELATIONS:
Dr. Charles D. Walcott, chairman.
Dr. S. W. Stratton.

HELICOPTER, *or* DIRECT-LIFT AIRCRAFT:
Dr. W. F. Durand, chairman.
Dr. Michael I. Pupin.
M. B. Sellers.
Dr. A. F. Zahm.
Prof. E. B. Wilson.

NOMENCLATURE FOR AERONAUTICS:
Dr. Joseph S. Ames, chairman.
Dr. S. W. Stratton.
Maj. Gen. George O. Squier, United States Army.
Capt. Mark L. Bristol, United States Navy.
Navy Constructor H. C. Richardson, United States Navy.

*PATENTS:
Dr. Charles D. Walcott, chairman.
Dr. S. W. Stratton.
Lieut. Commander J. H. Towers, United States Navy.
S. D. Waldon.
Frederick P. Fish.
W. Benton Crisp.
Dr. W. F. Durand.

*POLICY:
Prof. John F. Hayford, chairman.
Dr. Joseph S. Ames.
Dr. S. W. Stratton.

POWER PLANTS:
Dr. S. W. Stratton, chairman.
Maj. Gen. George O. Squier, United States Army.
Dr. W. F. Durand.
Lieut. Commander J. H. Towers, United States Navy.
Dr. H. C. Dickinson, secretary.
Prof. J. C. Riley.
Prof. E. Newcomb.
Lieut. Commander A. K. Atkins, United States Navy.

*QUARTERS:
Dr. S. W. Stratton, chairman.
Maj. Gen. George O. Squier, United States Army.

*RADIATOR DESIGN:
Naval Constructor H. C. Richardson, United States Navy, chairman.
Dr. S. W. Stratton.
Maj. Henry Souther.

RELATION OF THE ATMOSPHERE TO AERONAUTICS:
Prof. Charles F. Marvin, chairman.
Dr. Joseph S. Ames.
Prof. John F. Hayford.
Lieut. Commander J. H. Towers, United States Navy.

*SITE FOR EXPERIMENTAL FIELD:
Dr. Charles D. Walcott, chairman.
Prof. Charles F. Marvin.
Dr. S. W. Stratton.

SPECIAL COMMITTEE ON ENGINEERING PROBLEMS:
Dr. W. F. Durand, chairman.
Dr. S. W. Stratton.
Dr. A. F. Zahm.
Dr. H. C. Dickinson.
Herbert Chase.
Grover C. Loening.

STANDARDIZATION AND INVESTIGATION OF MATERIALS:
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Maj. Gen. George O. Squier, United States Army.
Dr. W. F. Durand.
Prof. John F. Hayford.
Naval Constructor J. C. Hunsaker, United States Navy.
J. H. Nelson.
E. D. Walen.
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  Naval Constructor J. C. Hunsaker, United Navy.
  Charles M. Manly.
  E. Blough.
  Z. Jeffries.
  Prof. C. H. Mathewson.

STEEL CONSTRUCTION FOR AIRCRAFT:
Dr. W. F. Durand, chairman.
Dr. S. W. Stratton.
Dr. A. F. Zahm.
F. G. Diffin.
W. B. Stout.
J. H. Nelson.
H. L. Whittemore.
J. W. Smith.
Jesse Coates.

Quarters for Committee

The office and headquarters of the committee are located in rooms 515-519 Munsey Building, Washington, D. C. The technical work of the committee, performed largely by or under the direction of the various subcommittees, is carried out in various laboratories and shops belonging to the Government and universities of learning whose facilities for scientific research are at the disposal of the Government.

To carry on the highly scientific and special investigations contemplated in the act establishing the committee, and which have, since the outbreak of the war, assumed greater importance, and for which facilities do not already exist, or exist in only a limited degree, the committee has contracted for a research laboratory to be erected on the Signal Corps Experimental Station, Langley Field, Hampton, Va. The dimensions of the research laboratory building are 123 by 52 feet. The building is two stories in height, constructed of red brick, with limestone belt courses, coping, and main entrances, including ornamental pediment. In the west half of the building, on the first floor, it is planned to locate a well-equipped machine shop and structural testing laboratory, with a pattern shop directly above the laboratory on the second floor. In the east half of the building, on both floors, it is planned to locate the executive offices, drafting rooms, photographic, physical, and chemical laboratories. The plot of ground on which the building is placed was assigned to the committee by the War Department and will allow the addition of two wings of the same size as the present building. There is also room for two wind tunnels which are contemplated in the near future. An engine test shed will be placed in a convenient location. Authority for the construction of small additional buildings necessary in connection with the laboratory was contained in the urgent deficiency act approved October 6, 1917.

Activities of the Committee in Connection with Preparation of an Aerial Fleet for War

In the latter part of March, 1917, when war with Germany seemed imminent, the committee, in conference with United States military and naval officers and manufacturers of aircraft, reviewed the condition of the aeronautic industry, the facilities then existing in this country for meeting the requirements of the Government, the possibilities of adequate expansion, and the then patent situation and its influence on the aeronautic industry.

A subcommittee was appointed to cooperate with representatives of aircraft manufacturers and to investigate all problems entering into the quantity production of aircraft for the Government. After careful study of the conditions then existing, the Advisory Committee submitted recommendations to the War and Navy Departments for increasing the quantity production of aircraft and urging the adoption of a continuing program of manufacture for the next three years.

In early April the chairman of the executive committee conferred with the Secretary of the Navy and the Secretary of War as to the best method to obtain the most efficient results in the development of aviation and the supply of aircraft for military and naval purposes, stating that the Advisory Committee deemed it desirable to create an aeronautical production board with a civilian head, but not a distinct Government department. This met the informal approval of the two secretaries, and after a thorough study of the problem and in the light of the history of the air services of England and France since the beginning of the war in Europe, the committee recommended to the Council of National Defense that a board be appointed by the Council of National Defense, with the approval of the Secretary of War and the Secretary of the Navy, to be known as the aircraft production board, whose duties would be to consider and deal with the problems arising in connection with the quantity production of aircraft in the United States for military purposes. The committee had previously undertaken a census of the production facilities of manufacturers of aircraft and aeronautic engines, and this information was made available to the aircraft production board at the beginning of its work in April. The Advisory Committee further recommended that the Secretary of War and the Secretary of the Navy appoint a joint technical board of the Army and Navy for determining specifications and methods of inspection for all aircraft requirements for the two services.

Ground Schools for Aviators

Supplementing the recommendations made to the Secretary of War and to the Secretary of the Navy that a continuing program be approved for the production of aircraft, on April 13 the committee recommended to the Council of National Defense that the several problem connected with the establishing of cadet training schools for aviators and with the production of aircraft should be considered together as interrelated problems and should also be considered jointly for the uses both of the Army and Navy.

The committee further, at the suggestion of and in cooperation with the War Department, took the initiative in organizing the several ground or cadet schools for the preliminary training of aviators in this country, and in determining the curriculum and methods of carrying on this instruction.

To this end the committee took under consideration the different methods of training used by Great Britain and France. A special commission was sent to Canada to study the methods of training used at the Camp Borden Military School of Aeronautics at Toronto. The committee called into conference representatives of the War Department, and of six established engineering schools in the United States in connection with the organization of this work. On recommendation of the committee the War Department selected the following six colleges for the establishment of ground-school training in aeronautics: Massachusetts Institute of Technology, Cornell University, Ohio State University, Illinois University, University of Texas, and University of California. Later Princeton University and Georgia School of Technology were added. After the desired organization and program of training had gained preliminary form, the work of further development and routine supervision was taken over by the War Department.

Naming of Flying Fields

In May, 1917, the committee suggested to the Secretary of War that flying fields be named in commemoration of individuals who had rendered conspicuous service or contributed to the development of aeronautics, and recommended that the aviation schools established near Dayton, Ohio; Champaign, Ill.; and Detroit, Mich., be named in honor of Wilbur Wright, Octave Chanute, and Lieut. Selfridge, respectively.

Department of Aeronautics

In connection with the consideration of a bill before Congress for the establishment of a separate department of aeronautics, the War Department, under date of May 16, 1917, asked the committee for a recommendation in the matter. The question was considered at the next meeting of the executive committee, and it was recorded as the sense of the meeting that all parties and governmental agencies connected with the development of the air service of the nation were cooperating in an efficient manner, and that nothing could be gained by the establishment of a department of aeronautics at that time.

Aeronautic Patents

In January, 1917, the War and Navy Departments called the attention of the Advisory Committee to the prohibitive prices of aircraft charged by the various aircraft manufacturers, attributing these prices to the extra item of royalty added by each firm in anticipation of infringement suits by owners of alleged basic aeronautic patents who were then threatening all other aeroplane and seaplane manufacturers with such suits, and causing thereby a general demoralization of the entire industry. After numerous meetings with Government officials, owners of patents, and aircraft manufacturers, extending over a period of several months, the committee recommended the organization of an association among aircraft manufacturers for the purpose of cross-licensing aeronautic patents between the members, such association to be known as the Manufacturers Aircraft Association. The committee cooperated also actively in the determination of the general terms and conditions of this agreement and in securing its adoption by the leading aircraft manufacturers of the country. The question of the legality of this associotion under the anti-trust statutes of the United States having been raised by the Aeronautical Society of America, the matter was submitted by the Secretary of War to the Attorney General of the United States for his opinion. Under date of October 6, 1917, the Attorney General rendered an opinion "that the association (incorporated), as now constituted, and the cross-license agreement under which it is now operated, are not in contravention of the anti-trust laws of the United States." The purposes in view in the formation of this association and which it is believed has been achieved, are the following:

(1) The prevention of the virtual deadlock with danger of monopoly existing under the patent situation as obtaining previous to its consummation, and the removal of restraint upon the trade operative under the existence of this patent situation.

(2) The settling or avoiding of all litigation, actual and prospective, under the previously existing patent situation.

(3) The opening of the industry to free competition of all aeroplane manufacturers and the opening of all patents held by the membership of the association to equal use and on equal terms.

(4) Provision, as set forth in the articles of agreement, whereby a design originating with a given manufacturer may be put into production and used by another manufacturer with all design data, drawings, specifications, etc., on the payment of a small fee, thus facilitating quantity production of an approved design and stimulating the production of new designs or processes.

(5) The development of financial stability and confidence in the aeroplane industry, thus making possible the financing of the absolutely needed expansion in order to take care of the expected demands.

(6) Reduced cost of aircraft to the Government by reduction of aeroplane royalties payable under all patents made available under the association to an amount less than one-half the figures previously demanded under a part only of these patents.

(7) Broadly speaking, the encouragement of aeroplane production to the highest practicable degree and with reference to the demands of the Government under war conditions.

Information from Europe

In March, 1917, the committee arranged, in conjunction with the National Research Council, for representation on the foreign committee sent abroad by the National Research Council to obtain detailed information on scientific matters of importance in connection with the war, and Dr. J. S. Ames, member of this committee, was appointed such representative.

Associate Members

In order to further develop contact with sources of information from abroad, Lieut. Col. L. W. H. Rees, R. F. C., a member of the British commission, together with Maj. Joseph Tulasne, Capt. Armand de Guiche, and Capt. Amaury de La Grange, of the French Flying Corps and members of the French commission, were made associate members of the committee, and as such attended its meetings, contributing valuable information and suggestions regarding matters with which they were especially familiar.

Sample Forms of Aeroplanes from Europe

In connection with the bringing of sample forms of aeroplanes from Europe for use in developing new designs in the United States, the committee cooperated with the War Department in the search for a site and in arranging for the construction of a suitable building.

Site for Experimental Laboratory

In October, 1916, the committee took under consideration the question of the selection of a suitable site for the committee's proposed experimental laboratory. In this study the committee acted in cooperation with a board of officers of the United States Army which had been appointed to inspect sites for the experiment station and proving ground of the War Department.

At the suggestion of the War Department requesting recommendation by the Advisory Committee in the matter, this committee inspected several proposed sites and after making inquiries as to the general health conditions and the problems of accessibility to Washington and the larger industrial centers of the East, protection from naval attack, climatic conditions, and cost of the site, it made recommendation to the War Department for the purchase of a site about 4 miles north of Hampton, Va., which recommendation was accepted by the War Department and the site was purchased.

On this field the War Department has allotted to the committee a space suited to the erection of the committee's proposed research laboratories. The committee has designed the first building of the group contemplated, and the design has been approved by the architects for the War Department. Contract has been entered into for the erection of the laboratory at an estimated cost of $80,900. The laboratory building is now in the course of construction. At this laboratory the committee will carry on, in wide variety, research and investigation relating to aeronautic science and including a study of planes in free flight. The committee has also under preparation plans for the first aerodynamic laboratory to be installed at Langley Field, intended for the development of high wind speeds. The work of this laboratory will be begun as soon as plans are ready.

(*Continued on page* 143)

THE LONDON ENEMY AIRCRAFT EXHIBIT

The Halberstadt Two-Seater

By G DOUGLAS WARDROP

THE little Halberstadt single-seater, two-strutter, which played its part on the Western front in the spring and summer of 1917, has been little seen during the last year, but recently there has appeared a two-seater Halberstadt, one of which is on view at the London Enemy Aircraft Exhibit.

The Halberstadt two-seater belongs to the C class, or general utility machines, variously employed for reconnaissance, artillery spotting, photography, etc. From a small plate on the machine the year of manufacture is 1917, but the exact date could not be ascertained. This will probably be found later on, when the wings have been stripped, to be stamped on the wing spars. The same plate bore the marking CLII, the exact meaning of which is not clear at the moment, but which evidently indicates some special employment of machines of the general C class. The general arrangement of the Halberstadt is not greatly different from other makes of German machines of the same class, although in minor details some unusual features were noticed.

The body resembles in shape that of the smaller single seater, being of rectangular cross section, surmounted by a curved top, and terminating at the stern in a horizontal knife's edge. Constructionally, however, the two-seater is different, inasmuch as it is covered with three-ply, whereas the single-seater body was of the girder type and covered with fabric.

The internal framework of the body appeared to be of the form usually employed with this construction. In the nose the body terminates in a "spinner" and on the whole the body appears to have a fairly good stream-line form. The engine fitted is a 160 h.p. Mercedes.

The seating accommodation is somewhat unusual in that both gunner and pilot are housed in a common cockpit, separated only by a deep transverse beam forming the back rest for the pilot. The armament consists of two machine guns, one fixed on the starboard side of the engine and operated by the pilot in the usual manner via an interrupter gear. The gunner's machine gun is mounted on a gun ring, of somewhat unusual appearance, mounted a considerable distance above the top of the body on a structure of tubes. A wireless set appears to have been fitted, judging from certain brackets in the gunner's cockpit.

The main planes, which were not in place on the machine examined, and which have not, therefore, been included in our drawing of the machine, apeared to be of equal span, but the chord of the lower plane is considerably smaller than that of the top plane. The mounting of the upper plane is somewhat unusual. From the body two struts slope outwards at a considerable angle, to the top plane. The two struts on each side connect the body and the rear top spar, coming to apoint on the spar, and apparently being vertical in front view. The aileron control is of the type originated by the Nieuport firm, i. e., the leading edge of the ailerons is formed by a steel tube, which extends through the wing into the center section of the top plane, where crank levers are fitted, connected up to the controls by vertical tubes. The latter are indicated in the drawing. The bottom planes are attached to the sides of the body.

The tail plane of the Halberstadt is of symmetrical cross-section, and is built up in two halves, attached on each side of the body. As the balanced rudder is wholly on top of the body, the elevator is in one piece, as shown in the sketch. There is no external bracing of the tail plane.

The undercarriage is of the usual Vee type, with stream-line steel tube struts. The apices of the two Vees are connected by two cross tubes, but no attempt has been make at stream-lining, the axle and the two cross tubes being left fully exposed to the air.

Huge Enemy Planes Seat 8 Men, Carry Bombs 13 Feet Long

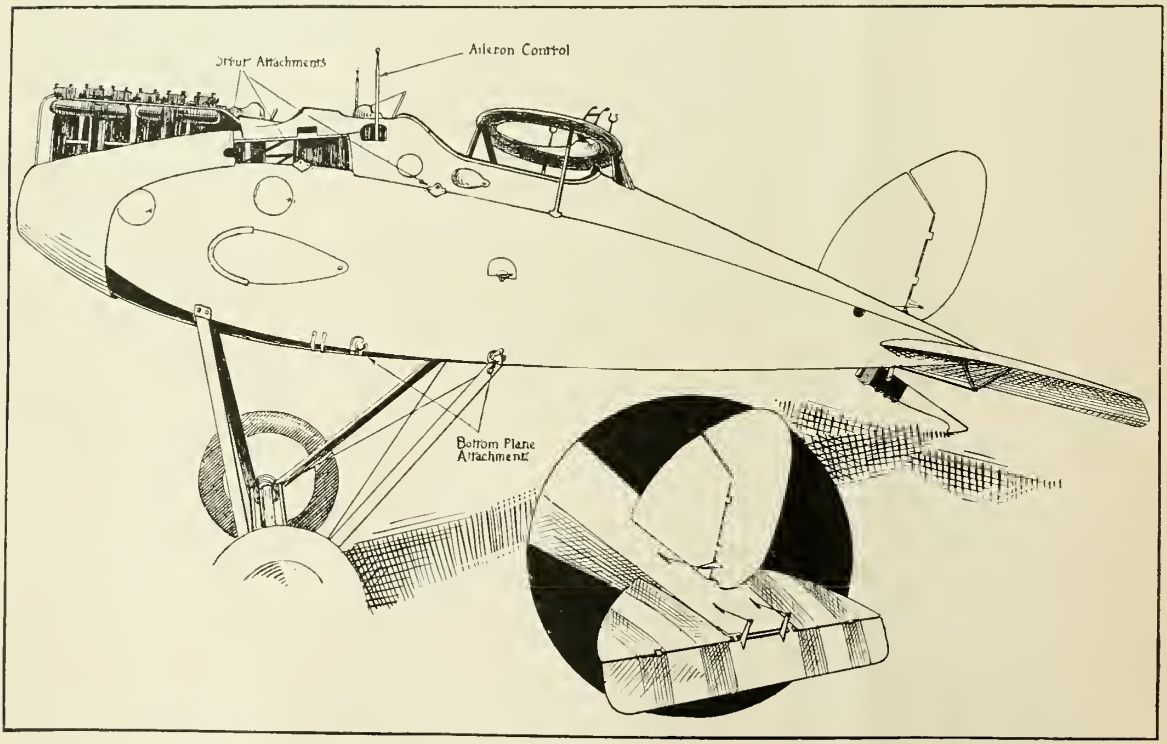
With the British Army in France.—On September 12 German aeroplanes bombed the St. Quentin sector, and the enemy utilized a number of new type planes of huge size. Three of these were shot down east of Peronne. They were capable of seating eight men.

The most astounding thing about them, however, was that they carried bombs thirteen feet long, which contained 2,000 pounds of explosives. This is by far the biggest bomb the Germans have yet produced.

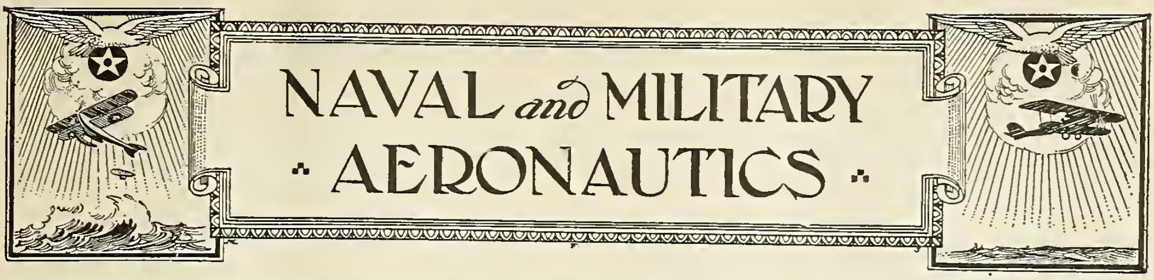
Big Martin Plane on Trial Flight

Another trial flight of the New Glen L. Martin passenger aeroplane was made Sept. 13th at Wilbur Wright Field.

While the Government censor does not permit the printing of a technical description of this aeroplane, it is permissible to state that the ship will easily carry from seven to ten passengers, although the seating capacity is built to accommodate four passengers.



Outline of the body of the Halberstadt two-seater biplane, 160 h. p. Mercedes engine. The inset is a sketch of the tail planes.



NAVAL and MILITARY AERONAUTICS

Key to Abbreviations

AAD—Assigned to active duty.
ADO—Report to Aviation Supply Depot, Dayton, Ohio.
ADT—Report to Aviation Supply Depot, Dallas, Texas.
AFO—Report to Aviation Supply Depot, Fairfield, O.
AGC—Report to Aviation Supply Depot, Garden City, L. I., N. Y.
AHT—Report to Aerial Gunnery School, Houston, Texas.
AIR—Transferred to the Air Service, National Army, without change in rank or date of commission.
ALF—Report to Camp Alfred Vail, Little Silver, N. J.
AMV—Report to Aviation General Supply Depot, Morrison, Va.
AOV—Report to School for Aerial Observers, Hampton, Va.
APR—Report to School of Aerial Photography, Rochester, N. Y.
ARV—Report to Aviation Supply Depot, Richmond, Va.
ASM—Report to Aviation Mechanics' Training School, St. Paul, Minn.
BFT—Report to Barron Field, Fort Worth, Texas.
BRN—Report to Bakers Field, Rochester, N. Y.
BST—Report to Brooks Field, San Antonio, Tex.
CAF—Report to Carlstrom Field, Arcadia, Fla.
CAP—Commissioned as Captain, Aviation Section, Signal Corps.
CDT—Report to Aviation Concentration Camp, Dallas, Texas.
CFT—Report to Carrutbers Field, Fort Worth, Texas.
CGC—Report to Aviation Concentration Camp, Garden City, L. I., N. Y.
CGS—Report to Aviation Concentration Camp, Greenville, S. C.
CIT—Report. to Radio School, Carnegie Institute of Technology, Pittsburgh, Pa.
CJS—Report to Camp Jackson, Columbia, S. C.
CJW—Report to Camp John Wise, San Antonio, Texas.
CLR—Commissioned as Colonel, Aviation Section, Signal Reserve Corps.
CMV—Report to Aviation Concentration Camp, Morrison, Va.
CPA—Commissioned as Captain Air Service, National Army.
CPR—Commissioned as Captain, Aviation Section, Signal Reserve Corps.
CRI—Report to Chanute Field, Rantoul, Ill.
CSO—Report to the Chief Signal Officer, Washington, D. C.
CUI—Report to School of Military Aeronautics, Cornell University, Ithaca, N. Y.
CWT—Report to Call Field, Wichita Falls, Texas
DAF—Report to Dorr Field, Arcadia, Fla.
DAP—Report to Director of Aircraft Production, Washington, D. C.
DIK—Report to Camp Dick, Dallas, Tex.
DIS—Honorably discharged from service.
DMA—Report to Director of MilitaryAeronautics, Washington, D. C.
ELA—Report to Eherts Field, Loanoke, Ark.
EOT—Report to Ellington Field, Olcott, Texas.
FLA—Commissioned as First Lieutenant Air Service, National Army.
FLR—Commissioned as First Lieutenant, Aviation Section, Signal Reserve Corps.
FLT—Commissioned as First Lieutenant, Aviation Section, Signal Corps.
FOB—Report to Fort Omaha Balloon School, Omaha, Neb.
FRF—On duty requiring regular and frequent aerial flights.
FSO—Report to Fort Sill School for Aerial Observers, Fort Sill, Okla.
GIT—Report to School of Military Aeronautics, Georgia Institute of Technology, Augusta, Ga.
GLC—Report to Gerstner Field, Lake Charles, La.
HHN—Report to Hazelhurst Field, Mineola, L. I., N. Y.
JMA—Rated as Junior Military Aviator.
JRC—Report to Jackson Field, Riverside, Cal.
KST—Report to Kelly Field, So. San Antonio, Tex. (When specified in the order, the number of the field is given in parentheses)
LDT—Report to Love Field, Dallas, Tex.
LHV—Report to Langley Field, Hampton, Va.
MAC—Report to March Field, Allesandro, Cal.
MAJ—Commissioned as Major, Aviation Section, Signal Corps.
MAT—Report to Mather Field, Sacramento, Cal.
MDO—Report to McCook Field, Dayton, Ohio.
MIT—Report to School of Military Aeronautics, Massachusetts Institute of Technology, Boston, Mass.
MJA—Commissioned as Major Air Service, National Army.
MJR—Commissioned as Major, Aviation Section, Signal Reserve Corps.
MSC—Report to Radio School, Maryland State Agricultural College, College Park, Md.
OBS—Attached to the Aeronautical Service as Observers.
OSU—Report to School of Military Aeronautics, Ohio State University, Columbus, Ohio.
PFO—Report to Post Field, Fort Sill, Okla.
PMT—Report to Park Field, Millington, Tenn.
PUP—Report to School of Military Aeronautics, Princeton University, Princeton, N. J.
PWM—Report to Payne Field, West Point, Miss.
REL—Relieved from present duty.
RSD—Report to Rockwell Field, San Diego, Cal.
RTR—Retransferred to organization attached to previous assignment to aviation duty.
RWT—Report to Rich Field, Waco, Tex.
SBI—Report to Scott Field, Belleville, Ill.
SAG—Report to Souther Field, Americus, Ga.
SGS—Report to Camp Sevier, Greenville, S. C.
SLA—Commissioned as Second Lieutenant Air Service, National Army.
SLR—Commissioned as Second Lieutenant, Aviation Section, Signal Reserve Corps.
SLT—Commissioned as Second Lieutenant, Aviation Section, Signal Corps.
SMM—Report to Selfridge Field, Mount Clemens, Mich.
SRC—Report to Columbia School for Radio Officers, New York City.
TFT—Report to Taliaferro Field, Fort Worth, Texas. (When specified in the order, the number of the field is given in parentheses)
TMA—Report to Taylor Field, Montgomery, Ala.
UCB—Report to School of Military Aeronautics, University of California, Berkeley, Cal.
UIU—Report to School of Military Aeronautics, University of Illinois, Urhana, Ill.
UTA—Report to School of Military Aeronautics, University of Texas, Austin, Tex.
VBW—Report to Vancouver Barracks, Washington.
WAC—Report to Aviation Concentration Camp, Waco, Tex.
WCS—Wire to the Chief Signal Officer upon arrival.
WDM—Wire, Director of Military Aeronautics, upon arrival.
WFO—Report to Wilhur Wright Field, Fairfield, Ohio.

Notes

Note 1—Report to places mentioned in order named for temporary duty.

Note 2—Report to Aviation Gen. Supply Depot, Detroit, Mich. Wire DAP.

Note 3—Report to S. C. Supply Depot, 39 and Winchester St., Chicago, Ill.

Note 4—Report to Supply Section, Dept. Mil. Aeronautics, Washington, D. C.

Note 5—Report to Aircraft Production Depot, Buffalo, N. Y.

Note 6—Report to Capt. R. J. MacKenzie, Standard Aero Corp., Elizaheth, N. J.

Note 7—Report to Maj. F. W. Leadhetter, 119 D. St., N. E., Washington, D. C.

Note 8—Report to U. S. Army Training Detachment, Iowa City, Iowa.

Note 9—Report to Dayton, O., Production Engineering Dept.

Note 10—Report to Dayton, O., Chief Technical Section.

Note 11—Report to Dayton, O., Aircraft Production Park.

Note 12—Report to Wright-Martin Corp., Long Island City, L. I.

Note 13—Report to Valparaiso University, Valparaiso, Ind.

Note 14—Report to Army Balloon School, Arcadia, Cal.

Note 15—Report to U. S. Industrial Chemical Co., Baltimore, Md.

Note 16—Report to Carnegie Inst. of Technology, Pittsburgh, Pa.

Note 17—Report to Dis. Mgr. Production, Bureau Aircraft Production, Chicago, Ill.

Special Orders Nos. 204 to 209, Inclusive

A	
Atwell, William Benefiel	SLA; DAF
Agee, William T	PFO
Anderson, Seymour Elmer	SLA: BST
Allen, Thomas B	PMT
Adams, Harold Verne	SLA: KST
Atkins, Edwin F., Jr	FLA
Ahl, Parker V	FLA
Aub, Anthony	CPA
Alvey, Aloysius B	FLA
Anderson, Alhert McWhorter	FLA
Atkins, James F	CWT
Anderson, Alhert E	UIU
Aney, Melvin C	FLA
Addington, Wayne W	PFO
Agramonte, Mariano Ignacio	SLA; ELA
Adams, James E	DMA
Anderson, George Francis	SLA: GLC
Akers, Claude	SLA; BST
Allison, Elmer Curtis	SLA: GLC
Anderson, Milton S	TFT
B	
Boose, Budd B	SLA: DAP
Betz, Carl Milton	SLA; EOT
Braden, Howard Herndon	SLA: FOB
Bahl, Errold Grover	SLA; RWT
Beauvais, Octave Peterson	SLA; HHN
Barnard, Frank L	TFT
Brown, Sewall	SLA; KST
Berthold, Oscar Hudson	SLA; MSC
Buffum, Frederick Cyrus, Jr	SLA; PMT
Behne, Thomas Darl	SLA; AAD
Boole, Samuel Harris	SLA; CRI
Bloomer, Asa Schoonmaker	SLA; FOB
Browning, Rohert L	PMT
Bartlett, Lowell Wilson	SLA; DAF
Bazell, Grover C	CGC
Britton, John Stephen	SLA; APR
Black, John Nelson	SLA; CJW
Bonneville, William Henry	SLA; AAD
Bostrom, Hjalmar O	CWT
Boerner, Eugene Sonnenberg	SLA; ELA
Baxter, Marcus Luling	SLA; ELA
Beaven, Joseph C	CUI
Booth, Morrison	SLA; FOB
Beasley, Henry Carrington	SLA; KST
Brown, Rohert James, Jr	FLA
Belkrap, Clifford Burton	SLA; CAF
Brenneman, Charles Gage	SLA: LDT
Bickerton, Howard Dewitt	SLA: DAF
Botts, Laurel Winter	SLA; BST
Burns, Thomas Russell	FLA
Broderson, Roy	GLC
Byerly, Frederick Marion	FLA
Bitber, Tom Allen	FLA
Blood, Frank Leroy	FLA
Belding, Hiram H., Jr	UIU
Barone, Tony	CWT
Blystone, Raymond John	BFT
Bullis, Leland Storey	SLA; DAF
Burk, Elmer E	VBW
Bash, Philip B	HHN
Burnam, Samuel P	DMA
Benson, Harry Constahle	SLA; DAP
Backus, Paul Milford	SLA; LDT
Bushman, Ralph John	SLA; DMA
Blair, Frank W	BST
Bridgman, Orlando W	BST
Brodd, Earl F	BST
Barher, Clifford Lamatte	SLA; GLC
Barr, George D	TFT
Blanchard, Leslie D	TFT
Brady, William T	TFT

Burch, Mark H	TFT
Burge, Kemp S	SMM
Byrne, Melvin Graves	SLA; GLC
Bolsinger, Clifford R	LHV
Blystone, Raymond J	WFO
Barmore, Henry D	Note 8
Borden, John A	Note 8
Balinger, Albert Joseph	FLA; Note 2
Brown, Fred L	Note 12
Brown, Homer	PFO

C

Clark, Bruce	SLA; ELA
Chamberlain, Rowland L	Note 10
Conway, Joseph Cleveland	SLA; KST
Calkins, Richard William	SLA; DAF
Carnes, Donald B	SLA; LDT
Coe, Bernard	SLA; LDT
Culver, Howard P	DMA
Caulfield, Hughes Joseph	SLA; LDT
Cannon, Walter Dewitt, Jr	SLA; LDT
Clark, Anson L	FLA
Cotton, Horace G	MAT
Callender, Marshall C	GLC
Carter, Samuel Oliver	SLA; CRI
Cooper, Edward Irving	SLA; ELA
Clark, Charles	SLA; DAF
Citron, Alvin Harold	SLA; DAF
Coolidge, Homer H	FLA
Clark, Carl F	CWT
Craig, Britt	SLA; KST
Carpell, Otto C	SLA; KST
Corbett, Thomas Cyril	SLA; LDT
Carter, Frank L	CWT
Culver, Rufus B	CWT
Campbell, Harold G	FLA
Camnitz, Edward	FLA
Carrington, George Dacr	FLA
Cake, Joseph Paul	FLA
Cummins, Albert S	FLA
Cane, Bernard M	CPA
Clark, John L	FLA
Culver, Edward P	SMM
Cuff, James W	FLA
Comegys, Leonard M	SMM
Catlin, Robert W	CWT
Carlberk, Don P	PFO
Coulter, Marion E	PFO
Case, Ira H	BFT
Cameron, Ralph McVean	SLA; GLC
Chandler, Homer B	JMA
Chamberlain, Stephen B	PFO
Callender, Leonard	SMM
Carmody, Arthur Roderick	SLA; KST
Cummins, John W	Note 17
Crisp, Marshall Claiborne	SLA; KST
Carrere, Charles Fitzhugh	SLA; LDT
Clark, Samuel Gilbert	SLA; GLC
Crouse, James Aubrey	SLA; LDT
Cate, Theodore Webster	SLA; GLC
Cressey, George Good	SLA; FOB
Charlton, Howard C	CWT
Condit, Kenneth H	WFO
Combs, Lester Samuel	SLA; CRI
Colman, Ben	SLA; LDT
Clark, William Patrick	SLA; CRI
Crowe, Dorsey Ryan	SLA; KST
Cameron, Charles R	MJA
Cabell, Philip F	TFT
Carney, Paul Julian	SLA; GLC

D

Dusossoit, Florimond Joseph	SLA; LDT
Dore, Charles Henry	SLA; LDT
Drumm, John Raymond	SLA; LDT
Dunn, Charles Albert	SLA; KST
Dodge, Vernon M	PFO
Doherty, George Daniel	SLA; PFO
Davis, John Williams	DMA
Dewey, John Payton	SLA; LDT
Dayton, William H	MAC
Dunlap, John Robertson, Jr	FLA
Durphy, Emmett Clinton	FLA
Dudley, Frank B	CPA
David, Earl	FLA
Doyle, Benton A	PrO
Denton, George R. S	FLA
Dickinson, Raymond S	CPA
Devine, Harold James	SLA; APR
Dwinell, Ralph Milton	SLA; PMT
Dolphin, Adrian James	SLA; LDT
Dale, Russell Charles	SLA; CRI
Draper, Gus A	BFT
Douglas, Albert N	CWT

E

Edgerton, James C	DMA
Eble, Ferdinand, Jr	SLA; DAF
Emig, Howard A	DAP
Evans, Elmer L	MAT
Evans, Earl F	TFT
Ennis, Eltin D	CWT
Elliott, Merle A	MAT
Eastman, Harold F	EOT
Eichelberger, George H	MJA
Emery, Forrest S	FLA
Eylers, John D	CGC
Eisenbeis, Herbert Oscar	SLA; GLC
Eustis, Edwin M	DMA
Elgin, Paul De Witt	SLA; Note 7
Ebbett, Percy J	DMA
Edwards, Richard D	BFT

F

French, Leigh Hill, Sr	CPA; VBW
Fredell, Edwin J	DAP
Frank, Walter H	JMA
Frazier, Walter Stephen, Jr	SLA; ELA
Fowler, Robert L., Jr	RWT
Ford, Bernard W	DMA
Fisher, Frank W	GLC
Fish, Farnum T	MAT
Finlay, George Dick	FLA
Ford, Donald	UIU
Frazer, Allen F	DAF
Fouts, Kenneth C	FLA
Fuller, Harold Chipman	SLA; LDT
Foxon, Roy Draper	SLA; ELA
Faucher, Joseph A	AAD
Fuhrman, Daniel Kennedy	FLA
Fisher, Stanton Baird	SLA; EOT
Fernhoff, Fred Bert	TMA
Foster, Edwin Beall	SLA; TFT
Frank, Philip Raymond	SLA; FOB
Flynn, Frank J	ELA
Farley, Henry Chester	SLA; LDT
Finlay, William P	TFT
Funsten, Randolph F	LDT

G

Grant, William Wulfing	SLA; TMA
Gifford, Raymond M	SMM
Graham, James L	SMM
Griffith, Edward C	SMM
G.blon, Earl Z	DAP
Guest, David P	GLC
Gault, John Bennett	SLA; LDT
Gardner, Kelsey B	CUI
Goetz, Fred Samuel	SLA; PMT
Gary, Francis P	CWT
Gri..th, John, Jr	SLA; PMT
Garver, Benjamin G	SMM
Gardner, Thomas A	CWT
George, Walter S	CPA
Grant, William W	WFO
Gish, Daniel Brailey	FLA
Grolman, Aaron	TFT
Grenawalt, Harold V	FLA
Gallagher, John J	CPA
Garner, Jack A	Note 5
Griffin, Norval B	ADT
Grekila, John H	CWT
Guinee, John William	SLA; CJW
Garrett, George A	FLA
Gateley, Francis Paul	SLA; CJW
Geary, Edward Andrew	SLA; CJW
Galbraith, George R	FLA

H

Huntington, Ralph Oscar	SLA; KST
Hearn, James Allan	SLA; DAF
High, Stanley Hoflund	SLA; DAF
Haight, Samuel	SLA; PFO
Hatfield, Paul Morrison	SLA; FOB
Holcombe, John M., Jr	WFO
Hagemeyer, Frank Herbert	SLA; LDT
Hudson, Harold	SLA; LDT
Hughes, Robert William	SLA; DAF
Harrison, Stanley Herbert	SLA; LDT
Hyde, Charles J	LDT
Hinckley, George Curtis	SLA; LDT
Houghton, Henry S	TFT
Hailey, Edward Gee	SLA; CAF
Handy, Homer Allen	SLA; LDT
Harris, Andrew Ross	SLA; FOB
Hamby, William F	CPA
Hanscon, Charles L	SMM
Hammond, Wilbur A	FLA
Hagerty, Edwin B	CPA
Hynds, Harold D	CPA
Hine, William H	FLA
Hearn, James A	GLC
Haugen, George A	CWT
Hay, Malcolm	PFO
Hunter, Leon W	PFO
Haile, Thomas J., Jr	CWT
Happ, Clarence W	DMA
Hall, Howard A	TFT
Hollopeter, Orville C	TFT
Hammond, Reginald G	TFT
Haynes, Grissom E	TFT
Harris, Henry L., Jr	CPA
Halbrook, Sidney W	BST
Hutson, John Raymond	SLA; Note 15
Hill, Lon C., Jr	CPA
Hughes, Archibald J	PFO
Hamer, Robert S	LHV

I

Imrie, Henry John Norman	SLA; LDT
Icenhower, Fred J	CPA
Irving, Elmer Ellsworth, Jr	SLA; KST

J

Jiskra, Joseph B	SRC
Jernigan, John Albert	FLA
Johnson, Renus E	CWT
Johnson, Perry V	TFT
Joralemon, Ira B	MJA
Johnson, Renus Edward	SLA; KST
Johnson, Edward L	CWT
Jones, Daniel B	Note 9
Jones, Roy L	LHV
Johnson, David S	FLA
Jacoby, Joseph Harry	SLA; KST
Jacobson, Hilding Leonard	SLA; CJW
James, Edward David	SLA; SAG

In the interior of a hangar. Planning a night bombing raid into the enemies' country

Jordan, Edward Francis	SLA; TFT
Jennings, John D	CWT
Johnston, Lloyd E	MAC
Jackskon, Norris D	SLA

K

Keale, Charles Frederick, Jr	SLA; LDT
Kirksey, Guy	SLA; BST
Kerr, Henry H., Jr	CWT
Keltus, John Aloysius	SLA; CAF
Kingshury, Joseph J	CJW
Kiplinger, Edmund E	PFO
Knauff, Calvin N	CWT
Kelly, Harold Richard	CPA
Keys, Douglas Leighon	CPA; DMA
King, Frank L	MAT
Kelly, Ralph M	MAC
Kerr, Rohert H	FLA
Keeler, Horace Bushnelll	SLA; FOB
Kehoe, Frank, Jr	CPA
Knight, Morris E	CPA
Keltus, John A	TFT
Keehle, Donald G	CPA
King, Joseph Garnet Wolseley	SLA; LDT
Kelly, Daniel James	FLA
Kelley, Ralph Leverett	FLA
Koontz, Ralph Grant	FLA
Kolh, William Mackpice	OBS
Korfhage, Harry G	CFT
Krotzer, Henry W	OBS
Kelleher, William P	MJA

L

Loderwyck, Arthur G	Note
Lithgow, John McMahan	SLA
Lee, Arthur	CPA
Ludwig, Nicholas H	FLA
Lewis, Mars	GLC
Lanfall, John T	GLC
Lewis, William Curtis Hill	SLA; LDT
Ledhury, Francis H	EOT
Lawton, Malcolm S	GLC
Lyon, William L	CWT
Levi, Henry	PUP
Lawrence, Theodore B	CPA
Lewis, Mars	SLA; DAF
Lohitz, Carl H	FLA
Lilley, Leonard E	Note 10
Ludwick, William Alfred	CPA; DMA
Lloyd, Milton DeGraw	SLA; CRI
Lincoln, Russell Fisher	SLA; DAP
Lawton, William W	BST
Lyons, Thomas Barton	Note 14
Loderwyck, Arthur G	Note 9
Lutz, David Brenton	SLA; LDT
Lyon, Alfred J	HHN
Lucas, Philip D	DMA
LaBelle, Claude A	Note 3
Loseth, August Lindor	SLA; CJW
Lamh, Donald Wingate	SLA; PMT
Leonhardt, Elmer G	DMA
Loriks, Carl Emill	SLA; GLC

M

Mitchell, Clark G	Note 9
Morgan, Lewis Hadyn	SLA; LDT
Moore, Donn C	GLC
Matthews, Thomas K	MAT
Murphy, Bernard Michael	SLA; FOB
Merritt, Wilson Parks	SLA; DAP
Martin, Thomas H	CWT
Merrill, Richard S	DMA
Murphy, George Valentine	SLA; LDT
Morton, Benjamin Rhoten	SLA; CRI
Marshall, William J	MAC
Mahee, David W	GLC
Maurer, Paul G	GLC
Moser, William C	GLC
Mapes, Samuel H	CGC
Myers, Carl E	MAT
Moffatt, James	CWT
Marschuetz, Elmer G	FLA
Miller, Ernest Huher	SLA; RWT
Mozley, Warren Merrill	SLA; LDT
Madenford, Raymond Sheridan	SLA; DAF
Miller, George Alfred	FLA
Montague, Enos J	UIU
Myers, Norman H	CWT
Mahan, John H	SBI
Mucklestone, Melville	SLA; LDT
Miller, Felix B	LDT
Morel, Emerson L	SMM
Maher, Cornelius C	CWT
Martin, Albert Aloysius	SLA; LDT
Milnes, Ralph Leslie	SLA; CJW
Mitchell, Oliver F	HHN
Munroe, George Cotton	SLA; LHV
Meller, Harry B	Note 16
Moore, Donn Clark	SLA; DAF
Myers, Vernon	SLA; LDT
Moery, Ralph	SLA; LDT
Millington, Russell Meader	SLA; KST
Meek, Frederick James	SLA; GLC
Menefee, Jesse I	DMA
Meng, Walter Joseph	SLA; KST
Mercer, Charles Philip	SLA; EOT
Metcalf, Frank	SMM
Meyen, Bert P	GLC
Minges, Henry V	GLC
Muehlherg, Clarence E	LHV
Meyer, Edward	LHV
Martin, Douglas E	LHV
Morrow, William M	CWT
Moses, Leonard	CWT
McWhirter, Louius Bransford	SLA; CAP
McManus, John Joseph	FLA
McCaulley, Edgar Lassell	SLA; DAP
McCahe, John E	SMM
McKay, Leo Hugh	SLA; DAF
McMorrow, William F	UIU
McMillan, James E	SLA; RSD
McCoy, Daniel C	CPA
McClellan, Charles William	SLA; LDT
McCluer, Charles F	CWT
MacEwen, Herhert Nathaniel	SLA; RWT
McNahh, David W	CPA
McRaith, Joseph G	LHV
McCahe, John H	CGC
McLaughlin, Dennis James	SLA; KST
McLeod, Leland S	CWT
McMinn, Wiley W	GLC

N

Norby, Erling S	MAC
Nellson, Frank Justin	SLA; KST
Norwood, John Stokes	SLA; KST
Newherry, Hawley DeWitt	SLA; KST
Nelson, Frank J	CWT
Neill, William C	FLA
Neidig, William N	CPA
Newmeyer, William L	CAF
Neff, Clarence A	FLA
Nelson, Martin A	CWT

O

O'Brien, Roland Henry	SLA; LDT
O'Brien, John Joseph	DMA
O'Brien, Frank E	CWT
O'Neill, Grover	CPA
Ordway, Lucius P., Jr	DMA
Organ, Vernon C	GLC
Oliver, William Bryant	FLA
Olmstead, Rossiter D	CWT
Oldys, Rohert	CPA
Ordway, William F	TFT

P

Poppic, Arnold, Jr	SLA; TMA
Phelps, Allen Cleveland	FLA
Pell, Clarence Cecil	FLA
Schreeppel, Harold H	SAG
Peters, Walter LeRoy	SLA; SBI
Preston, Ord	CPA
Peters, Crawford A	TFT
Pugh, Harvey M	MAC
Potter, Charles M	GLC
Porter, Lester Leon	SLA; KST
Patrick, Howard	SLA; ELA
Pulliam, Ellis P	CRI
Peterson, Frank Seth	SLA; LDT
Pennyhacker, Percy V	CPA
Painter, Theophilus S	CPA
Proctor, David Cogswell	CPA
Pentland, Henry B	CWT
Phillips, Charles T	CPA
Pierce, Walter Griffin	FLA

(*Continued on page 140*)

Air Chiefs in conference at Rockwell Field. Major-General W. L. Kenly, Director of Military Aeronautics and Major Burwell, Chief at Rockwell Field

FOREIGN NEWS

GREAT BRITAIN

On the night of Aug. 21-22 the weather conditions were exceptionally good, and a large amount of work was carried out by our squadron.

Military objectives at Frankfort and Cologne were heavily attacked. Very good results were observed, and bombs were sent all around the stations and barracks.

A railway junction of Treves was also successfully attacked. All our machines returned safely.

Four hostile aerodromes were heavily bombed and many hangars hit. Machine guns were freely used on aerodromes, trains, and searchlights as well as anti-aerial batteries. One of our machines is missing.

On the morning of Aug. 22 one of our squadrons attacked the chemical factories at Mannheim. During the heavy fighting on the outward journey two of our machines were brought down. The remainder reached and successfully bombed their objective. Very fierce fighting again took place on the return journey, as a result of which five more of our machines are missing. Three hostile aeroplanes were destroyed. Two of these seemed to crash, and one went down in flames.

Two other squadrons attacked the railway sidings at Coblenz at about 7:30 o'clock on the morning of Aug. 22, and a hostile aerodrome at Hagenau was bombed with very good results. All these machines returned safely.

During the night 194 tons of bombs were dropped, and 215 tons of projectiles were dropped during the day.

The feature of recent air work has been the bombing of enemy aerodromes by overwhelming forces of our aircraft. Two of these raids, on August 16-17, give an idea of their effectiveness.

A large number of our machines started about noon for the Haubourdin aerodrome. Arriving there about 1 o'clock, they attacked from an average height of about 200 feet and at this elevation in daylight made good hits with their bombs. No enemy aeroplanes tried to interfere, but two were seen and attacked; one shot down crashed into some trees close to the aerodrome; the other was driven down and presumably crashed, although it was not observed actually to hit the ground.

The machine guns and anti-aircraft guns, which were plentiful about the aerodrome, were attacked from above by machine guns on our aeroplanes as soon as they opened fire or disclosed their positions. All were silenced; none did any harm. Hundreds of bombs were dropped. Three large iron hangars containing numbers of enemy machines were destroyed; six others were known to have been hit and partly wrecked. Two machines on the ground outside of the sheds were hit by bombs and burned.

Fires were caused in the officers' and men's quarters and a building supposed to be the officers' mess was blown up and destroyed. A number of other outbuildings, including one ammunition shed, were set afire and a large number of casualties were caused among the mechanics and other personnel, who when the raid began ran toward a hospital in the neighborhood for shelter.

After half an hour spent in destroying the aerodrome, other objects were sought. A train on the railway was shot at, chased and finally stopped. One staff motor car was shot at on the road and overturned into a ditch; another was made to run up a steep bank, where it stuck; no occupant was left in either, presumably all were killed. Finally several transports were shot at on the road and men and horses were seen to fall. All our machines returned home safely.

The raid on the following day started earlier, the machines going out at 7 o'clock. The objective this time was the Lomme aerodrome, where the sheds were of wood or canvas. More than 100 bombs were dropped, some from heights as low as fifty feet, which was too low because the concussion strained our own machines. Four sheds were set afire and it is believed three others were destroyed. A number of outbuildings were wrecked and the personnel running in all directions, were chased and killed or driven to shelter.

Large workshops near by were hit by several bombs and left smouldering. Two enemy aeroplanes which were met dived to the ground and crashed on the aerodrome in mere terror, without being shot at. Afterward our men attacked troops and transports. One of our machines was shot down by the anti-aircraft defences; all the others returned undamaged.

It is believed that in each case the result of the raid was the practical obliteration of the aerodrome and the destruction probably of all the machines in them and of a large part of the personnel.

The official statement on aerial operations issued Sept. 6th says:

Much reconnaissance and photographic work was accomplished by the air force on Sept. 4 and a large number of artillery and contact patrols were carried out. The weight of bombs dropped by us during the day was twenty-three tons. No bombing was possible after dark.

Enemy machines, working in large formations on the German side of the lines, showed considerable activity. Twenty-five hostile machines were brought down by our airmen and no less than nine ballloons were shot down in flames. In addition fourteen hostile machines were driven down out of control. Sixteen of our machines are missing.

One of our machines reported as missing in the fighting of Sept. 2 has since returned.

In the course of the weeks which have elapsed since the commencement of our offensive on Aug. 8, 465 enemy machines have been brought down by our airmen, their destruction being in every case clearly established. In addition, the total of enemy machines proved to have been driven down out of control, many of which must actually have crashed, is exactly 200.

The above figures are exclusive of the considerable number of enemy machines brought down by gunfire from the ground. Sixty-one German balloons have been set on fire. Nine hundred and eleven and one-half tons of bombs have been dropped by us.

Practically the whole of the air fighting has taken place on the enemy's side of the line. The number of our machines which have failed to return during this period is 262.

The storm centre of British aerial activity throughout the week has been the sector from Lens to Peronne, the airmen materially assisting in piercing the immensely strong Hindenburg defences and harassing the retreating enemy. German organizations behind the Wotan line, including the vital railways radiating from Valenciennes, were heavily bombed. In the course of the week 166 tons of explosives were dropped in the battle area. Ninety-two enemy machines were destroyed and forty-five disabled, while seventy-five British machines were reported as missing.

Eleven German aeroplanes were brought down on Sept. 6, in air fighting, and twelve were driven down out of control. One enemy balloon was destroyed. Five of our machines are missing.

Observation for the artillery was continued both by aeroplane and balloons. Some valuable reconnoisances were carried out by our machines, and a large number of photographs were taken, while our balloons reported much useful tactical information.

During the day and the following night thirty-two tons of bombs were dropped by our airmen, the railway connections at Armentières, Lille, Douri, Denain, Cambrai, and St. Quentin being heavily attacked. All our night-flying machines have returned.

On the night of Sept. 6-7 our squadrons carried out attacks against two hostile aerodromes. Fires were caused, but observation of the results was hindered by weather conditions, as were operations generally. All of our machines returned.

On the morning of Sept. 7 our squadrons attacked the railways at Ehrang, (four miles northeast of Treves, Prussia,) and the chemical works at Mannheim Good bursts were observed on and beside the railway lines at Ehrang.

Fierce opposition was met with in the raid on Mannheim, but, despite this, the objective was reached and successfully bombed. Eight direct hits and many other good bursts were observed on the chemical works. Our squadrons fought largely superior numbers of enemy aeroplanes both before and after reaching the objective.

One squadron had a hard, continuous fight for a distance of seventy miles before reaching its objective, and the fight continued for another seventy miles on the way back. Over two tons of bombs were dropped on Mannheim.

As a result of the fighting one enemy aeroplane was destroyed and two more were driven down out of control. Four of our machines are missing.

Clouds and rainstorms limited work in the air on Sept. 7, but a good deal of artillery observation was carried out, as well as reconnoissances and contact patrols. Eight hostile machines and one balloon were destroyed by our airmen. Three of our machines are missing.

Thirteen tons of bombs were dropped by us during the twenty-four hours. Our night bombing machines all returned safely.

FRANCE

The French War Office, in reporting on operations in Macedonia, says that French, Serbian, and British aviators dropped two tons of bombs on enemy encampments.

Marshal Foch has made the following announcement on September 16:

"Fair weather enabled our aviators to do a great amount of work on our own front, as well as in connection with the American Army. There were many severe combats. Fourteen enemy aeroplanes were brought down or put out of action and seven captive balloons set on fire. Our airmen attacked the enemy with machine guns and bombs. On enemy concentrations seven tons of explosives were dropped.

"Our airmen continued their activity during the night and dropped more than twenty-three tons of explosives on the railroad stations at Laon, Hortier, Juniville, Conflans, Mars-la-Tour and other places. Our observation aeroplanes made numerous reconnaissances, regulated the artillery fire and took some photographs far behind the enemy lines."

The Allied pursuit groups played a large part in maintaining an aerial barrage over the sector of the advance and attacked enemy planes and balloons wherever found. The work of the observation corps was greatly facilitated thereby.

The pilots and observers of the Allied units fired more than 30,000 rounds from their machine guns at convoys on the roads, artillery and troop concentrations.

Several enemy squadrillas came in the direction of Paris during the night. Our lookout posts followed and reported their movements and they were subjected to a particularly intense barrage. Other methods of defense were also put into operation. Several bombs are reported to have been dropped, causing a certain number of victims and material damage. The alarm was given at 1:25 and the "all clear" at 3 o'clock.

One of the enemy planes was brought down by a shot from the artillery. The machine fell in one of the northern suburbs. In the wreckage were found the bodies of an officer and two men.

The French War Office has issued the following upon aviation activities:

"On September 16 eight enemy planes were brought down or damaged and one captive balloon was burned. Night bombing machines, notwithstanding the storm, dropped ten tons of projectiles on enemy stations, bivouacs and aviation grounds. Several fires broke out."

In aerial fighting on September 16, French aviators destroyed 12 German aeroplanes and set on fire 16 captive balloons. Sunday night bombing squadrons dropped forty-six tons of bombs on military targets behind the German lines from Laon to Metz.

GERMANY

The German official report for September 16 says:

"As a reprisal for the continued bombing of German towns, 22,000 kilograms of bombs were dropped on Paris last night.

"We shot down four enemy aeroplanes and fifteen captive balloons."

The official statement on aviation activities for September 17 says:

"Yesterday we shot down 44 enemy aeroplanes. Colonel Lorzer achieved his fortieth and Lieutenant Rumey his thirty-fifth victory. Lieutenant Thuy achieved his fiftieth aerial victory."

MODEL NEWS

Edited by John F. McMahon

Model Aeroplane Building as a Step to Aeronautical Engineering

Gasoline Engines

WE will now take up Gasolene Motors. This type of motor is of more difficult construction than the Compressed Air or Steam Engine. The principal of the engines are much the same, the only difference is, the gasolene engine works on internal combustion, by that I mean that the compressed air motors or the steam engines are driven by means of pressure forced into a tank for the former and generating steam in a boiler for the latter.

The Gasolene Engine does not need a boiler or a tank. The gas is sucked into the cylinder by the piston and then compressed by the action of the piston as it again ascends to its highest point where it is exploded by a spark. This explosion expands the highly explosive mixture and forces the piston down. Of course the reader will readily see that the constant explosions cause wear and tear on the cylinders, pistons, and bearings and the construction must be better and heavier than is needed in the other types.

The construction of a gasolene engine presents many difficulties and very few are known to be successful, the main reason for this being the saving of weight without sacrificing strength, so for this reason I do not think it advisable to start work on this type of motor. Of course if the reader happens to be a machinist, he can attempt to construct the motor from the data which follows.

It is not necessary to build a Gasolene motor to be a good Aeroplane pilot, but he must have a thorough knowledge of the workings of a Gasoline Engine.

The accompanying cut will show the working principle of two different types of gas engines.

Figures 1, 2, 3, and 4 show the four cycle type which means that in order to suck in the gas, compress it, explode, and last exhaust it, the engine must make four separate strokes.

Figures 5 and 6 are for the two cycle type which only needs two strokes to do the same as the four cycle.

Figure 7 shows the piston at its highest point and about to start down. This action will cause a suction of gas through the intake valve, which is automatic, being held in a closed position by the spring, only opening when the suction becomes strong enough to pull it out of place.

When the piston reaches its lowest point, the intake valve closes and the piston starts upward and compresses the gas because it has no possible channel in which to escape Figure 2.

In Figure 3, the gas being compressed the spark is timed to fire just as the piston reaches top centre, and the piston is forced down. This is the power stroke.

Figure 4, the piston is at its lowest point and starts upward, forcing the burnt gas out through the exhaust valve which is opened by the cam, rotated by the gear arrangement at half speed.

The piston travels to its highest point again and is now in position to suck in raw gas. These are the four strokes of a four cycle engine.

The Figure 5 shows the first stroke of the two cycle engine, or explosion stroke. The explosion drives the piston down which compresses the gas in the crankcase. When the piston reaches the bottom the compressed raw gas is released and shoots up through a channel uncovered by the piston and into the chamber at the top. To keep the gas from shooting directly across and out through the exhaust parts a baffle plate is attached to the piston. This baffle plate causes the gas to shoot upward and to force the burnt gas out at the same time.

The piston now starts back and compresses the new gas, at the same time forming a vacuum in the crank case which sucks in raw gas which will be compressed and forced into the top chamber when the piston reaches the bottom centre. See Figure 6.

A close study of these figures will show the reader without any explanations, the working of a two cycle engine.

Another point to be remembered is the elimination of valves in this type of engine. This saves considerable weight and makes it adaptable to model aeroplane practice, and but for its cranky ways would be an ideal piece of mechanism. A one cylinder two cycle engine of a certain size is almost as powerful as a *two* cylinder engine of the four cycle type as it gets a power stroke for each revolution while the four cycle engine gets a power stroke for every other revolution.

To the right of the cut are two views of a small motor of the two cycle type to give the reader an idea of the proportions. The cylinder and crankcase are of aluminum castings machined later. The piston is made of cast iron with two rings and is almost a shell. The connecting rod is made of thin steel casting, the wrist pin bearing is just a ½" hole while the big end is two piece and babbited with white metal.

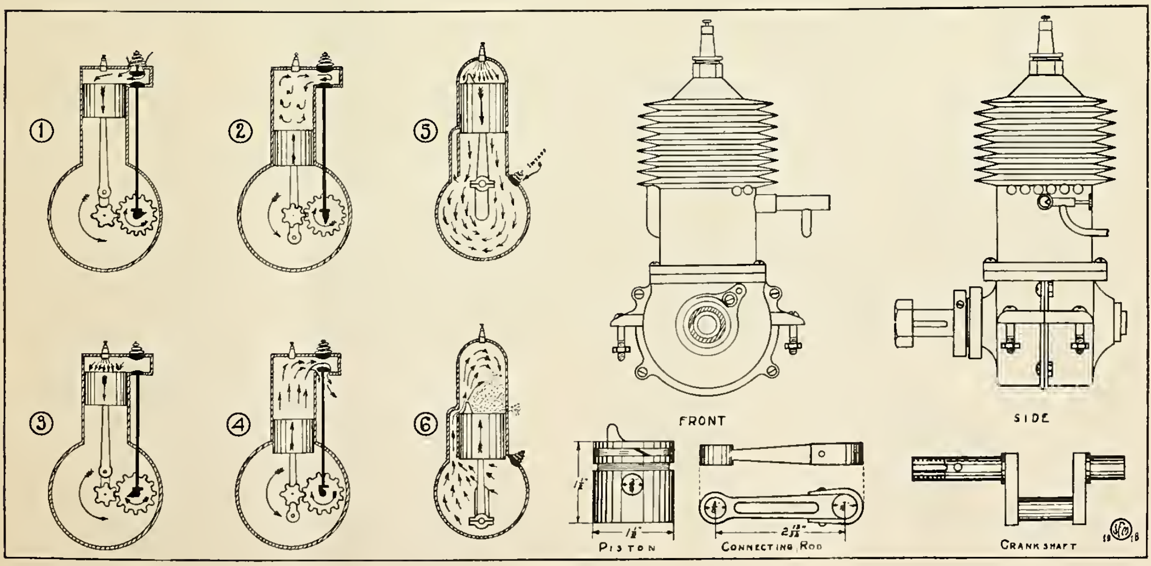
The bearings of the crankshaft are fitted with bronze bushings. The crankshaft is turned from a solid piece of steel and fits tightly into the bearings so as not to leak compression.

The carburetor is in name only it would be better to call it a mixing valve, it is clearly shown in the drawing. The stroke and bore of this engine are 1½".

This motor weighs 19 ounces and gives ½ h.p. at 2000 R.P.M.

So much for motors we will now start on our man carrying glider.

(To be continued)



Aeronitis

Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

The Colonel Meets Some New Uniforms

They wore new serge uniforms, leather puttees, and Stetsons just out of the box which showed the recently purchased silver and black hat cord off to a great advantage. The trio stood near the Post Office waiting for a bus to go to town. They appeared well satisfied with themselves and the world in general and when the commandant of the field rounded the corner in his car not one of the three appeared to notice him. In fact, they ignored him. Nary a ripple from them did the Colonel get. The car stopped.

"Come here," said the Colonel to the trio, at the same time motioning to an interested M. P. to be ready for action.

"Don't you know enough to salute superior officers?" asked the Colonel severely.

"Well, I'll tell you old man," answered one of them taking a cigarette from his mouth and blowing the smoke smoothly over the ash, "we've talked among ourselves about it and Washington has given no word to satisfy us. Some say we should, others say we shouldn't, so there you are. I suppose it's alright for you but we're not so sure." "Say," he broke off suddenly, "that dog's face is queerly marked. Ever try using mange soap for those flees?"

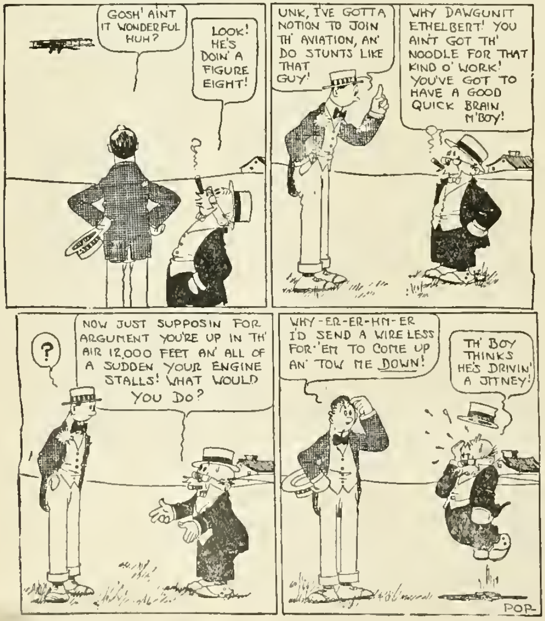
The Colonel gasped. "How long have you three been on this field," he thundered. The M. P. trembled and prepared to do his duty. The P. O. C. puffed on a cigarette and said calmly:

"About three months. And let me tell you, old scout, it's hotter than hell in that post office since they made us wear uniforms."

"Drive on!" said the Colonel to his chauffeur.

"Wonder who that guy was," one of the P. O. C. said. "He sure acted as though he thought he knew us."

Keeping Up With the Joneses—Nothing Like a Quick Brain.—By Pop.


GOSH! AINT IT WONDERFUL HUH?
LOOK! HE'S DOIN' A FIGURE EIGHT!
UNK, I'VE GOTTA NOTION TO JOIN TH' AVIATION, AN' DO STUNTS LIKE THAT GUY!
WHY DAWGUNIT ETHELBERT! YOU AIN'T GOT TH' NOODLE FOR THAT KIND O' WORK! YOU'VE GOT TO HAVE A GOOD QUICK BRAIN M'BOY!
?
NOW JUST SUPPOSIN FOR ARGUMENT YOU'RE UP IN TH' AIR 12,000 FEET AN' ALL OF A SUDDEN YOUR ENGINE STALLS! WHAT WOULD YOU DO?
WHY-ER-ER-HM-ER I'D SEND A WIRELESS FOR 'EM TO COME UP AN' TOW ME DOWN!
TH' BOY THINKS HE'S DRIVIN' A JITNEY!
POP

Courtesy N. Y. Globe.

Omar Kayyenne

(A Hot-Aircraft Poem)

Awake! for Morning in the Bowl of Night
Has flung the Stone that put the Zepps to flight.
 The Men who sought the Raiders have returned.
They very nearly found them—but not quite.

And as the Cock crew, those beside the Shed
Welcomed them Home, believing them all dead;
 Put the Machines away, and talked a while,
Brought forth the Wine—and then went back to Bed.

And strange, among the Anti-Aircraft Lot
Some could articulate, while Others not;
 And suddenly One more impatient cried:
"Who is the Potter, pray, who failed to Pot?"

Then somewhat peevishly there answered One,
In private Life a local Butcher's Son,
 "To-night it was my Turn to Biff the Zepp—
But I forgot to load the Beastly Gun."

Thinking this deeply o'er, as best I may,
I turn aside, and Someone comes my Way—
 An Expert, knowing All there is to know,
And to himself I hear him softly say:

"Indeed, the Slide-Rules I have loved so long
Have done my Credit in Men's Eyes much Wrong,
 Have set The Aeroplane upon my track,
And sold my Reputation for a Song."

Myself when young did eagerly frequent
Whitehall and Thereabouts, and Months I spent
 Hoping to gain one Stripe at least; alas!
I left by the same Door as in I went.

How sweet is learning how to fly, think Some;
Others—how blest the D.S.O.'s to come!
 Ah, take the Cash in Hand, and damn the Rest—
Test new Machines, and you will make Things hum.

To wander round the Haunts of Flying Men
Gives Inspiration to the Poet's Pen.
 On every Hand one hears, with grateful Joy,
A Touch of true Refinement now and then.

For in an Aerodrome, one dusk of Day,
I watched a School-'bus sticking in the Clay,
 And one Mechanic to the Other said:
"Go gently with it, Brother—gently, pray!"

Then said an Engine, with a long-drawn Sigh:
"My Bearings with Neglect have long gone dry,
 But, fill me with the old familiar Juice—
Methinks I might recover by-and-by!"

The Scout no Question makes of Ayes or Noes,
But right or left, as banks the Pilot, goes,
 And he who dropped One down into the Field—
He knows about it all—he knows, he knows!

Here with a Dud Machine, if Winds allow,
A Flask of Wine, a Load of Bombs—and Thou
 Before me sitting in the Second Seat—
A Midnight Raid is Paradise enow.

And when I turn upon the Homeward Trail,
Dreaming of Decorations, Cakes, and Ale,
 How bitter on the First Day's Leave to find
My Name spelt wrongly in the "Daily Mail"!

Rapid Balance at Nominal Cost.

The old fashioned cut and try method of obtaining running balance—especially with turbine rotors, motor-generator sets, having two armatures mounted on one shaft or with other very long rotating elements—often required efforts extending for days or even weeks, accompanied by much "higher mathematics" regarding critical speeds, etc.

These difficulties have been so multiplied by the modern tendency toward constantly higher speeds that they almost determined the limitations of the designing engineer. With the advent, however, of the

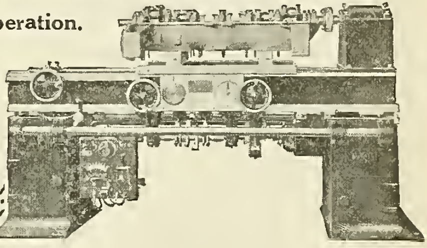
CARWEN DYNAMIC BALANCING MACHINE

These problems have been solved by a direct, straightforward procedure, which quickly determines the exact amount of metal to be removed from, or added to, any rotating element to put it in exact running balance. It also locates positively where this change should be made.

With ordinary shop skill and a "Carwen", 100 armatures (or crankshafts) can be put in precise running balance—not mere static balance—in an 8 hour day.

Made in sizes suitable for balancing objects weighing all the way from 5 oz. to 15,000 lbs.

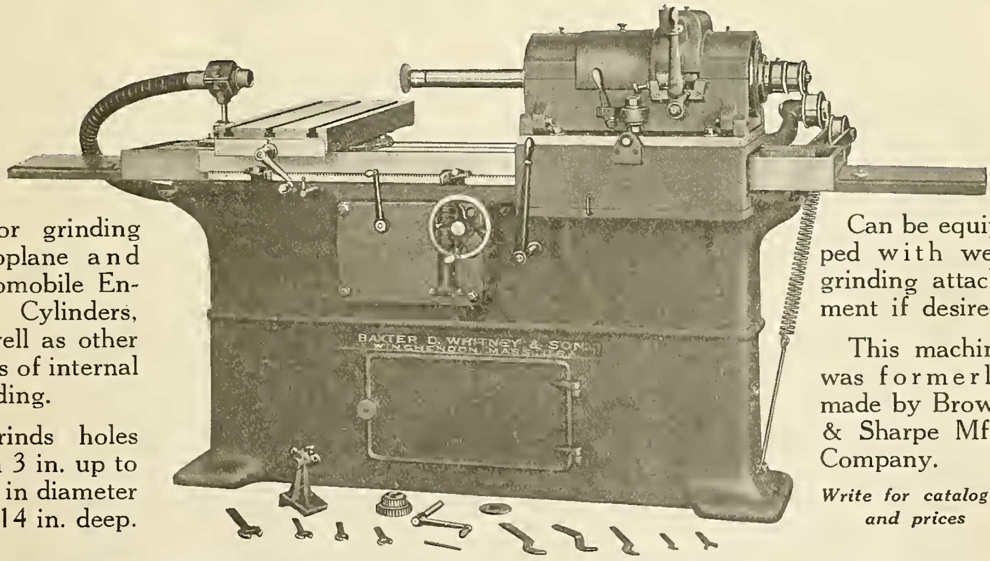
Send for illustrated booklet that describes principle and operation.



The Carlson-Wenstrom Co.
Erie Avenue at Richmond Street
Philadelphia, Pa.

Makers also
of CARWEN
Double Row Ball Bearings

Cylinder Grinding Machine



For grinding Aeroplane and Automobile Engine Cylinders, as well as other kinds of internal grinding.

Grinds holes from 3 in. up to 7 in. in diameter and 14 in. deep.

Can be equipped with wet-grinding attachment if desired.

This machine was formerly made by Brown & Sharpe Mfg. Company.

Write for catalogue and prices

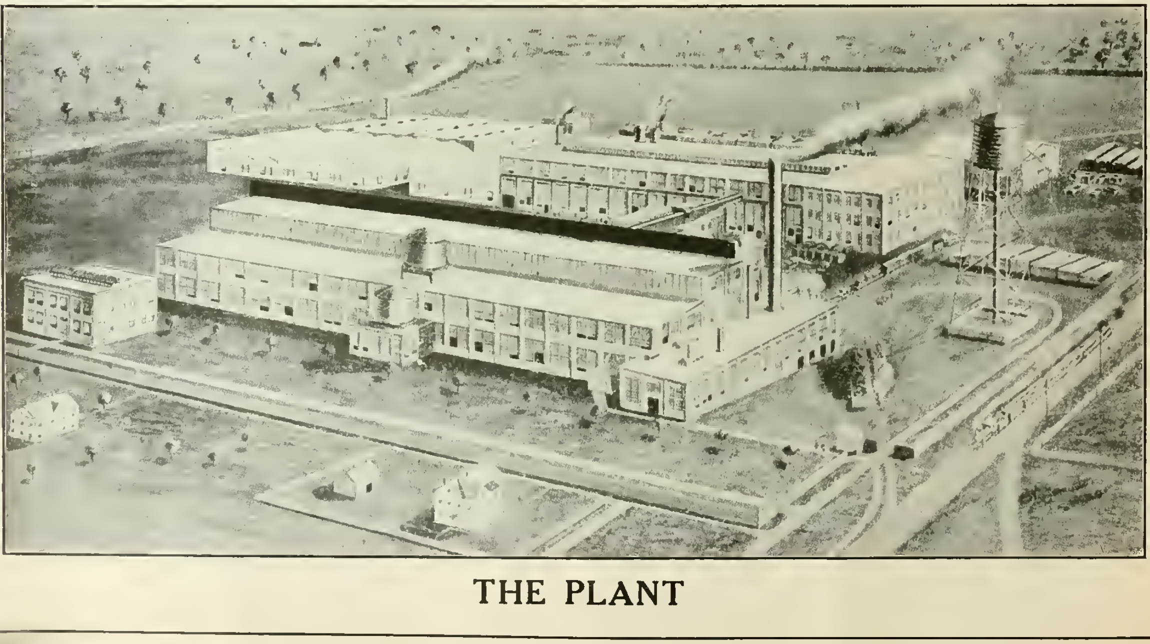
Baxter D. Whitney & Son, Winchendon, Mass., U. S. A.

Domestic Agents: E. A. Kinsey Co., Cincinnati, Ohio. Strong, Carlisle & Hammond Co., Cleveland, O., and Detroit, Mich. The Motch & Merryweather Machinery Co., Pittsburgh, Pa. Machine Tool Engineering Co., New York, N. Y. **Pacific Coast Agents:** Portland Machinery Co., Portland, Ore. Perine Machinery Co., Seattle, Wash.

Canadian Agents: Canadian Fairbanks-Morse Co., Montreal, P. Q. **Foreign Agents:** Buck & Hickman, Ltd., London, England. Fenwick Freres Co., Paris, France.

Lawson
AIRCRAFT

THE PRODUCT



THE PLANT

TRANS-OCEANIC FLOAT SYSTEM

Alfred W. Lawson, Vice-President and General Manager of the LAWSON AIRCRAFT CORPORATION, who has spent the last eleven years helping to develop the aircraft industry in the United States, is the inventor of a system of transporting airplanes across oceans by their own power.

According to this system any airplane that is capable of flying and carrying more than one hour's fuel and oil can be flown across the Atlantic or any other ocean.

Any aviator who has graduated from one of the United States training schools will be qualified to pilot an airplane across the ocean, according to Mr. Lawson's system, the chief requirement being that he knows how to make a good landing.

It will be easier for a pilot to fly across the Atlantic Ocean by this system than for one to make a cross country flight of the same number of miles for the simple reason that by this system the landing place is always within sight and within gliding distance.

Briefly an outline of the plan is as follows:

Approximately 25 miles apart between the coast of America and the coast of France will be placed floats upon which the pilot can land and depart from whenever he wants to descend for fuel or repairs.

These floats are to be approximately 500 feet long and 100 feet wide, but can be increased in length and width if preferred.

These floats are built in the shape of regular steamship hulls and are kept in their position of latitude and longitude by their own power.

These floats are protected from submarines by carrying longer range guns than the submarines carry and also by a system of nets which protect them against torpedoes. They are also further protected by the airplanes which carry a supply of bombs for that purpose.

In the holds of these floats are carried the supplies of fuel and spare parts for airplanes, as well as a repair shop, and sleeping apartments, and dining rooms, etc., for the pilots and crew.

The float will contain a slowing up process whereby the speediest machines can be stopped within 300 feet and slow machines within 100 feet.

There will be elevators arranged at both the bow and the stern of the float whereby airplanes can be let down into the hold and receive their fuel and repairs out of the way of other machines while landing.

The float is always headed into the wind so that the pilot always lands into the wind from the stern, while he is let down into the hold at the bow and then moved back in the hold to the stern again where he is elevated to the deck, from whence he starts off on his journey again into the wind. By this method, airplanes can be landed and sent off again at the rate of one every five minutes.

On condition that each machine stopped at every 4th float more than 1,000 airplanes can be transported from America to France every day that the weather is suitable.

It is estimated that there are more than 150 suitable flying days over the Atlantic Ocean during the course of a year, so that by this system it is possible to send to France more than 150,000 airplanes of every description in a year.

By this system, airplanes can be sent across the Atlantic Ocean within 24 hours, or they can be sent from factories in the interior of the United States to the battlefronts in the interior of France within 48 hours, thus saving all of the material and labor necessitated in crating the machines at the factory and uncrating them and setting them up at the battlefields.

At the present time by steamship methods it requires more than 30 days to deliver airplanes from the factory to the battlefront, and therefore more than 90% in time will be saved by this system in delivery of machines.

This system will also save the transportation cost of the pilots, who will also receive some much needed practice in flying en route. If 100,000 airplanes were transported across the Atlantic by this system that would mean a saving in shipping facilities for 200,000 more troops alone. It would also save enormous shipping facilities for other war materials that would take the place of the space occupied by the extremely bulky airplanes.

Besides the time and shipping facilities saved on the transportation of 100,000 airplanes an approximate saving in the cost of transportation will total more than $100,000,000.

This system can be put into operation within 4 months after it has been begun, and Mr. Lawson is ready to give an actual demonstration of its practicability immediately if called upon to do so.

Many letters have been received from the leading aircraft engineers and manufacturers of the United States in which they say, that they have examined Mr. Lawson's system and find it practical in every way.

The engineering force of the LAWSON AIRCRAFT CORPORATION are unanimous in their praise of the system, and the LAWSON AIRCRAFT CORPORATION herewith publicly advocate and recommend that the United States Government give it a trial and if found practical to utilize it at the earliest possible moment as one of the short cuts to the heart of the Kaiser.

THE LAWSON AIRCRAFT CORPORATION

GREEN BAY, WISCONSIN

Petterson, Alfred William	SLA; DAF
Powel, Harford W. H., Jr	CPA
Purcell, Robert Francis	FLA
Peck, Theodore Abbott	FLA
Peterson, Hugh C	FLA
Pollock, Jacques J	SMM
Pratt, George Wollage	SLA; LDT
Pawson, James M	PFO
Prosser, James R	PFO
Port, John Thomas	SLA; TFT
Pierce, Karl Nelson	SLA; TFT
Pickett, Norman Otto	SLA; EOT
Patton, Alexander E	Note 9
Parfet, Clarence C	SMM
Penbertby, Paul	TFT
Parsons, Charles Wesley Darwin	FLA; DAP

R

Renz, Walter Frederick	SLA; CRI
Redmond, Joseph John	FLA; DAP
Robbins, Oliver Kendall	SLA; CRI
Rascovar, Frank James	FLA
Rodgers, Edward F	CWT
Ridenour, Carlyle H	MAC
Rotbfeld, Tracy L	CWT
Richards, Homer M	GLC
Reese, Paul J	WFO
Toronto, Albert H	FLA
Rogers, George Walter	FLA
Rodgers, Edward Francis	SLA; KST
Riddle, Sydney W	LDT
Randolph, Roy J	SMM
Roberts, Carroll McLean	FLA
Reitenbaugh, John Smith	FLA
Runstrom, Albin Leonard	SLA; TFT
Raucb, George LaVerne	FLA; VBW
Rummey, Raymond Corsin	SLA; ELA
Raber, Oran Levi	SLA; CJW
Russell, Lindsey	SLA; RWT
Regan, Joseph John	SLA; CRI
Robb, Louis Maurice	SLA; TMA
Reynolds, John W	SMM
Regan, Francis M	PFO

S

Schapiro, Louis	SLA; DAP
Staples, Julian Price	SLA; KST
Sullivan, Edward Michel	SLA; BST
Simmons, Ernest Pitkin	SLA; FOB
Sipp, Edward A	Note 9
Scupbam, Edward Jefferson	SLA; PMT
Smith, Albert D	RSD
Sonntag, William Douglass	SLA; DAF
Salisbury, Glen David	SLA; ARV
Small, Clement	CWT
Salyers, Charles David	SLA; SBI
Schick, Hebert M	WFO
Spain, Thomas H	WFO
Steele, Armstrong Steele	SLA; TMA
Spencer, Haven Henry	SLA; KST
Shaffer, William D	CPA
Sheedy, Charles A	CPA
Smitb, Theodore E., Jr	FLA
Shannon, Torrance T	FLA
Sogge, Richard C	CWT
Sevey, William B	TFT
Saucier, Loren R	GLC
Somerby, Philip B	KST
Sales, John P	MAT
Swan, Robert E. L	CPA
Shedd, Paul Wesley	SLA; ELA
Saxton, Harold George	SLA; ELA
Smith, Lyle Calvinee	SLA; LDT
Stromme, Joseph Leonard	FLA
Strong, William Millgrove	FLA
Searle, George L	FLA
Sears, Stacey Orin	FLA
Smith, John H., Jr	FLA
Scarritt, Arthur Davis	SLA; LDT
Semans, Frank Wendall	FLA
Sands, Harold Ayman	FLA
Sullivan, Mitchell S	CRI
Schmertz, Percy	TFT
Schumacher, Charles Henry	FLA
Shipp, Thomas S	FLA
Sopp, Gilbert H	FLA
Stone, John P	FLA
Steele, John L., Jr	GLC
Spencer, Clarendon R	SMM
Sloan, Kellogg	FLA
Smith, Chandler	Note 13
Striker, Wallace M	UTA
Sheppard, Robert Z	BST
Schiller, Carl J	FOB
Roberts, Ray Bell	SLA; KST
Scarlett, George G	Note 5
Sargent, Winthrop O	PFO
Steinkamp, Christopher	SLA; GLC
Stevenson, William Forest	WDA
Scudders, Lawrence Williams	SLA; DAP
Smith, Harold Francis	SLA; LDT
Spangberg, Leonard Victor	SLA; KST
Simm, Percy Roy	SLA; TFT
Shroyer, David Mirven	SLA; GLC
Schofield, Earl S	MJA
Shaver, John B	TFT
Sears, Kenneth Craddock	SLA; FOB
Sullivan, Elliott M	CWT
Switzer, Stanley Thomas	SLA; CJW
Shook, Charles H	FLA
Sullivan, Daniel J	GLC

T

Tureck, John C	KST
Thompson, Bernard S	DAF
Torrey, Marshall George	SLA; ELA
Tolbert, Benjamin H	GLC
Tuska, Clarence D	FLA
Turner, Homer H	UIU
Thompson, Charles Henry	SLA; LDT
Titus, Hubert Josiah	SLA; CRI
Tolman, Crittenden A. C	MAC
Thompson, John H	CWT
Thomas, Harry L	CWT
Torrey, Richard Hamilton	CPA
Thomas, James Louis	FLA
Teasel, Chester Charles	SLA; AAD
Trabold, Arthur R	CPA
Tingle, Charles Guy	CPA
Trask, Verne A	CWT
Tempest, Rolland	FLA
Taylor, Ryland G	FLA
Thorndike, Herbert A	CPA
Thompson, Paul Evan	SLA; BST
Taft, Frank W	FLA
Teague, Newton N	L.
Templeton, James Bourland	FLA
Tandy, Howard N	CUI
Thompson, Ernest A. U	CWT
Tommers, Andrew E. B	FLA
Taylor, Emerson L	WFO
Tucker, Albert J	FOB
Topping, Nathaniel Howell	PMT
Tilbrook, Milton A	LHV
Thompson, John M., Jr	Note 10
Tanner, Ned Virgil	FLA; Note 4
Tickell, Samuel Alexander	SLA; Note 6
Todd, Clarence Welhoff	SLA; KST
Titus, Silas J	HHN
Tomlinson, John Wilder	SLA; PMT
Taylor, Carroll G	GLC

U

Uhler, Thedore Clay	SLA; AAD
Underwood, Harry Theodore	CPA
Utrich, William Joseph	FLA

V

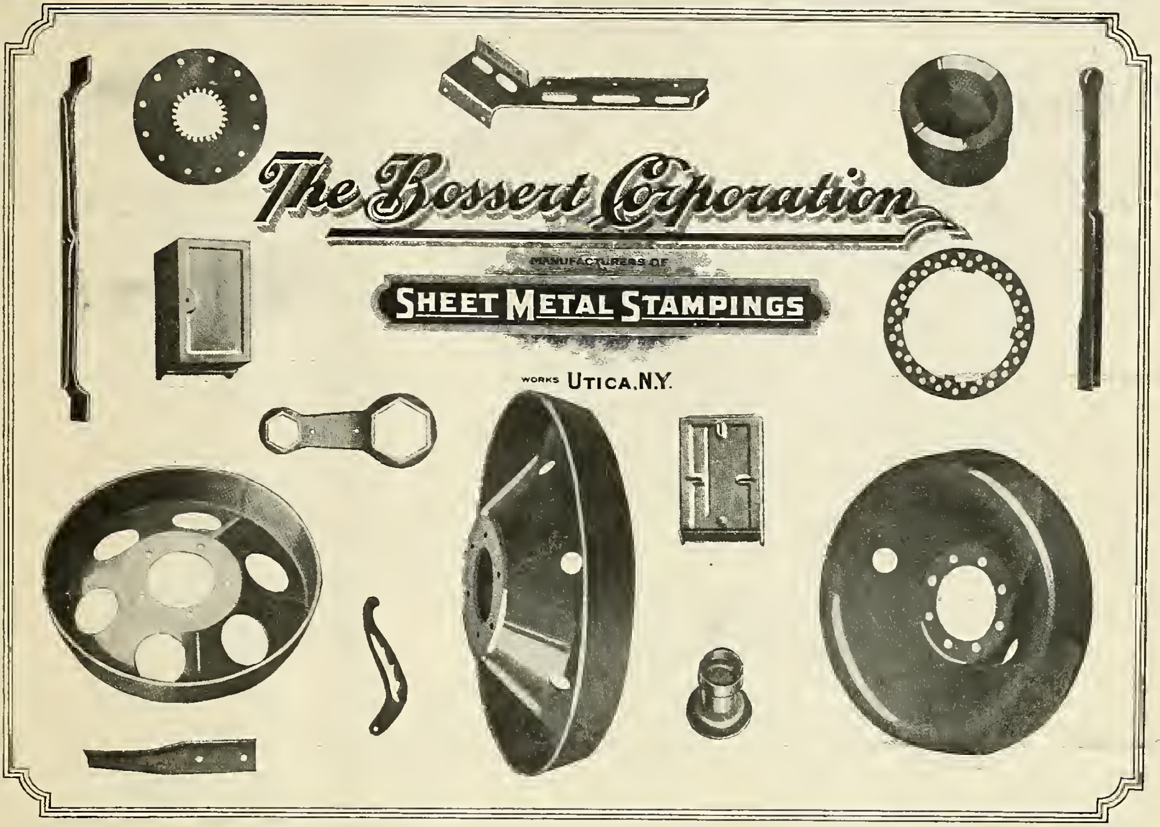
Van Ness, Carl Condit	SLA; PFO
Van Arsdale, Ray C	LDT
Van Horn, Daniell Rowell	SLA; KST
Vaughan, Harper Burnice	SLA; BST

W

Wuenker, Ralph Frederick	SLA; EOT
Whitbeck, John E	Note 9
Webster, Julius Prince	CPA; DAP
Wells, Howard H	MAC
Waldon, Sydney D	DMA
Wood, Seth F. A	DMA
White, Ralph Kirk	SLA; BST
Ware, Lawton Henry	SLA; DAF
Weyant, Romber G	GLC
Williams, Paul L	GLC
Wright, Ellijah F., Jr	GLC
Watt, David	FLA
Wentworth, Harry David	SLA; CRI
Wirz, Walter	PFO
Warren, Robert Edwin	SLA; BST
Watson, Philip Wilder	SLA; ELA
Wilder, Myles S	CWT
Wallace, Arthur E	GLC
Wright, Charles N	GLC
Whitelaw, James C	MAC
Wieslander, Leslie R	MAT
Wetherbee, Alex Perron	SLA; CAF
Williams, William C	CWT
Woodland, Stanley	CPA
Weems, Wharton E	CPA
Wilson, John L	CWT
Wenzlau, Charles Norman	SLA; KST
Woods, Clyde	CWT
Wolf, Irwin D	CPA
Williams, Philip Roy	FLA
Woodies, Arthur F	FLA
Warner, Harold J	FLA
White, Fred J	CPA
Welch, James Wells	FLA
Worthington, John A	FLA
Witmer, David J	CPA
Wyman, Franklin	FLA
Wheeler, Chester E	FLA
Walker, Henry E	CPA
Warfield, Robert L	CWT
Wetzel, John R	ELA
Ward, Charles Paul	SLA; SAG
Wade, Herbert C	TFT
Williams, Isaac J	TFT
White, Earl F	WFO
Wyatt, John Albert	SLA; GLC
Willkins, Charles Lincoln, Jr	SLA; GLC
Weaver, Warren	SLA; DAP
Williamson, Robert C	Note 9
Walsh, Clarence Edward	SLA; ELA
White, Leonard Maxwell	SLA; UCB
Wood, Norman Horatio	SLA; CWT
Wiley, Clarence Donald	SLA; KST
Wiegand, Vernon I. E	TMA

AN OVERHEAD PHOTOGRAPH SHOWING THE POSITION OF THE BLOCK SHIPS SUNK AT THE ENTRANCE OF ZEEBRUGGE HARBOR

This official photograph was taken from an aeroplane flying over Zeebrugge, and clearly proves how effective the fairway into the port was obstructed by the block ships sunk there. The "Iphigenia" and the "Intrepid," their funnels showing above water, can be seen lying in the entrance to the Bruges Canal, while the "Thetis" was sunk outside the mouth of the canal in the main channel of the harbor. Some small enemy craft are also visible



Y

Young, Fred	MAC
Yocis, Anthony J	SMM
York, John Y., Jr	FLA
Yaple, Lee G	CWT
Younglove, Roy S	WFO
Yeomans, James H	Note 11
Yeiser, Henry Craig	SLA; FOB

Z

Zahner, Louis Cappell	SLA; DAP
Zeller, Marquis S	FLA
Zoline, Orrin B	PWT

The World of Worthy Appeal

(*Written Exclusively for Aerial Age Weekly*)

During the Fourth Liberty Loan Drive, which begins on September 28 and ends on October 19, think and talk nothing else. Nobody knows where a word may sell a bond, so talk, talk, talk! Buy all you can yourself; then sell all you are able to sell by a word of mouth appeal to anybody who will listen to you.

Remember how much the Kaiser accomplished by just *talk*. He and his henchmen knew better than any other persons in the world the value of the talk of the fellow in the street to the other man, nor did they under-estimate the importance of the petty conversations between housewives over the back fences.

They sent their ideas trickling by word of mouth from the poisoned source in the place of the All Highest, down through half the valleys of the world, a stream that gathered force and volume as it sped, until it flowed out into an ocean of blood.

They called it propaganda; literally, it is plain gossip, sent abroad to work its will in the plastic minds of the Germans at home and to convince all else who might heed. In New York, San Francisco, London and Paris and Hong Kong, the vile stream flowed, overlapping its banks and fertilizing new field for German kultur.

Some of that stream of talk we have been able to dam by building up dykes made of the bodies of men, dykes that now run over half the world.

You can help to tend these dykes by fighting talk with talk. Talk Allied Ideals, Americanism, all the time, but for the twenty-two days of the Fourth Liberty Loan Drive, talk Bonds, and Bonds.

Even if your propaganda only persuades one person to buy one bond, you will be directly loading a gun for a soldier.

Naval Aviation Schools

Washington, D. C.—The Navy Department authorizes the following:

The first aviation unit organized in America and sent abroad using American-made material, was the First Marine Aeronautic Company, equipped for water flying only, which is now stationed abroad at a Naval Base. This information is given in an announcement of the progress of Marine Corps aviation which has just been made public at Marine Corps Headquarters.

In addition to the flying field maintained at Miami, Florida, where all training in actual flying is given, the Aviation section of the Marine Corps gives candidates instruction in ground work at the Massachusetts Institute of Technology, Boston, Mass., and has two schools for instruction in aviation mechanics.

The course in actual flying at the Marine Flying Field, Miami, which covers a period of 75 days, includes preliminary, acrobatic and formation flying. All students receive instruction in bombing, gunnery and reconnoissance work. The reconnoissance work, the most hazardous feature of aviation, includes following up bombing squadrons for making photographic records. In obtaining these photographic records, the aerial photographers must make their way to the scene of activity and not only record the result of the bombing but evade the prepared enemy fire as well.

At the Massachusetts Institute of Technology, where all ground work instruction is given, there are now 289 students. One hundred and thirty-two men are in classes and 157 are awaiting assignment. When marines are assigned to this school they are enrolled as Gunnery Sergeants for the duration of the course and receive the pay allotted to this rank. Those who show themselves to be promising material are made officers after completing their training as fliers. The ground course lasts about 10 weeks and 80 men are graduated each month. No break is allowed in the supply of men to the school, by keeping 100 men in reserve to be passed upon by Aviation officers. If a man fails to be graduated he has the option of being transferred to training for regular duty in the Marine Corps, or being discharged.

Of the two schools for mechanics, the larger is maintained at the Naval School for Mechanics, Marine Corps Section, Great Lakes Training Station, Chicago, Ill. Here marines are trained as mechanics, riggers and armorers. At present there are 120 enlisted men taking the course at Great Lakes, and 60 men are sent each month from the Marine Corps. The total number of men allotted to the Marine Corps at one time is 360.

The second school for aviation mechanics is located at the Naval School, Marine Corps Section, San Diego, California. The training is the same as given at the Great Lakes School. Ninety-three enlisted marines are taking the course at the present time. The capacity is 120.

At present the Marine Corps Aviation Forces in France, equipped for land flying only, are performing pursuit, combat, bombing and reconnoisance duty. In addition, they are performing duties which involve actual flying with heavier and lighter-than-air craft, the former consisting of pursuit, combat and gunnery machines, seaplanes and flying boats. Kite balloons are used in performing the duties connected with lighter-than-air craft.

An Aviation Section is maintained at Headquarters, U. S. Marine Corps. All selections for the personnel of the Marine Reserve Flying Corps are made by this office. It also makes all requests for material for the use of the Aviation Section, obtained from the army and navy. It is estimated that in addition to the personnel at present attached to Aviation, it will need 1,500 officers and 6,000 enlisted men to carry on the work assigned to the Aviation Section of the Marine Corps during the next year.

The Aviation Section of the Marine Corps will be called upon to furnish replacements for duties abroad. Since the recent arrival of Marine Aviation Forces in France, the operations have been very successful. One officer has been recommended for the Distinguished Service Cross and Medal of Honor for bringing down enemy planes.

The standard of the Marine Reserve Flying Corps is very high. No men are accepted for entrance into its Ground School with the prospect of becoming officers unless they are as nearly physically perfect as possible. Applicants must weigh not less than 135 pounds and not over 165 pounds. The enlisted personnel has been selected from the very best in the Marine Corps. They are highly trained and given every opportunity for promotion to a commission.

Swimmer Saves Air Pilot

Babylon, L. I.—Quick action on the part of Dr. Harold E. Hewletts saved the life of a cadet who had fallen four hundred feet this afternoon with his hydroplane alongside Wagstaff Creek.

Dr. Hewletts was in swimming near the Babylon Club. He saw the plane about four hundred feet in the air and that the pilot seemed to have trouble in making a bank. Suddenly the machine buckled and fell to the bank alongside the creek, pinning the pilot beneath it.

Dr. Hewletts jumped into a rowboat and with others hurried to the young man, who was unconscious when finally extricated from the tangled mass. An automobile was pressed into service after Dr. Hewletts had partially revived the cadet and he was taken to the naval aero station at Bayshore.

It was impossible to learn the name of the pilot. At the station, however, it was said that he would recover. He was badly cut and bruised about the hip.

That Standard Production is a vital factor in giving wings of combat to our national bird, is a source of patriotic pride to the Standard Aircraft Corporation — "A Real Fighting Industry."

Member of Manufacturers'
Aircraft Association, Inc.

(*Continued from page* 127)

relation was given in the following form:

$$\text{Let } x = \text{ratio of } \frac{\text{engine weigbt less fuel}}{\text{aeroplane weight less engine}}$$

If, then, the engine weight is increased y times in order to obtain a thermal efficiency a times tbe first, a must be greater than $\frac{x + y}{x + 1}$, if the maximum range of flight of the machine is to be increased. Thus, if $x = 4$, which is a fairly normal value, and $y = 1.5$ (*i.e.*, engine weight increased by 50%), the new efficiency required to give increased range of flight must he greater than $\frac{5.5}{5} = 1.1$ times the first, or the efficiency must be increased by more than 10%. From this, therefore, it is apparent that the choice of types A and B will depend entirely upon the purpose to be achieved, *i.e.*, upon the range of flight.

Referring to figs. 10 and 11 again another fact is apparent. The heavily loaded machine is best suited by an engine possessing a large excess of power wbich can be used readily for climbing purposes, or, if the wing area were variable, for increase of speed at will. Since in such a machine the question of minimum weight is not so pressing as in the lightly loaded machine, it would seem that an engine working as closely as possible to type B, and hence possessing a high efficiency, could be designed more readily for a heavily loaded machine to perform a flight of lengthy range than for a lightly loaded machine in which the question of getting a light enough, and at the same time efficient, engine would present some difficulty. Type A, of course, possesses most of the advantages for flights of ordinary range.

One hesitates to suggest how the problem of the application of the dual combustion cycle to aero engines may be met, so many seem to be the difficulties with which an attempted application seems to be beset. These difficulties conquered, however, means quite a desirable improvement in the power weight factor of an engine, and it would thus appear worth while to devote some attention to the possibility of its successful attainment. The writer is sanguine enough to think that a satisfactory aero engine can be designed to burn the lighter oils at constant volume, with an additional combustion process at constant pressure using the heavier oils, or the lighter oils if desired. The prohlem might be met by the application of some system of direct injection by positive air pressure of constant velocity past the fuel jet such as proposed by Mr. A. W. Reeves.

The writer would here point out that the successful introduction of dual combustion working would afford an efficient method of governing by the pilot of an aeroplane. At its full power the engine would be working on type A, ρ having its maximum value. This will be when climbing. If control is exercised over the constant pressure combustion period only in order to reduce the power developed, as will be necessary for horizontal flight, tbere will be an increase of thermal efficiency. Thus, when flying horizontally at its normal speed through the air, an aeroplane would demand from an engine worked satisfactorily on this cycle a smaller fuel consumption per horse-power than when employed in climbing or flying at excessive speeds.

Complete Expansion and Compounding

The remainder of these notes may be taken now to apply to all internal combustion engines in general. They are partly the outcome of an interesting article on "The Case for Compound Engines," by Mr. J. L. Napier, wbich appeared in the April issue, 1916, of *The Automobile Engineer.*

In Mr. Napier's article a table is given in whicb the increase of power obtained by compounding is given in relation to tbe amount of fuel burned. The Otto cycle is developed exclusively, *i.e.*, all the heat is developed at constant volume. The table is partly reproduced here, with tbe difference that a is now written for R and r for n. The table was subsequently modified to include possible losses, but for comparative purposes Table I is here sufficient:

TABLE I

a	r	Limit of Expansion Volumes	Maximum Additional Power Per Cent
2	4	6.728	15.4
3	4	9.116	25.0
4	4	11.316	31.8

If, now, fig. 4 is consulted, showing the variation of efficiency in both types A and B, it appears that increase of fuel burned increases the divergence between the efficiency values. It is obvious that if the same amount of fuel is consideerd to be burned in both types, then the difference in the efficiencies will represent the gain of type B over type A. For example, suppose $a = 3$ and $\rho = 2$, r being equal 5, then the efficiency of type A is 41.5%, while that of type B is 60%, *i.e.*, there is an economic gain of $\frac{18.5}{41.5} \times 100 = 44.6\%$ by carrying out the expansion as in type B. In fig. 12 this case is represented by tbe two sections of the diagram, the unshaded portion representing the power developed in the h.p. cylinder if compounding is adopted, while the shaded portion represents that developed in the l.p. cylinder.

It is interesting to notice that if the case of type B is examined where $a = 1$, the efficiency is independent of fuel burned, since it is equal to $1 - \frac{1}{r^{r} - 1}$, the well-known expression for the efficiency of the constant pressure cycle. It is only on the introduction of constant volume combustion in type B that the efficiency increases with an increase of ρ. Thus, if $r = 5$, $\gamma = 1.4$, and $a = 2$, tbe compression pressure is 145 lb. per sq. in. absolute, and the explosion pressure is 290 lb. per sq. in. absolute. The efficiency is 47.5%, no matter how much a may be increased. If, however, some fuel is burned at constant pressure and the expansion carried out by compounding in the manner of type B, the efficiency goes on increasing up to the limit $1 - \frac{1}{r^{r} - 1}$, where r, however, is not the *actual* compression ratio, but the *virtual* compression ratio, giving a final compression pressure of 290 lb. per sq. in. absolute. If $\gamma = 1.4$, this value of $r = 8.2$. It can be seen on reference to fig. 5 that this approach to the limiting efficiency occurs rapidly at the beginning of constant pressure combustion. In other words, it may be said that by means of constant pressure combustion the compression ratio of type B has been raised *virtually* as regards efficiency from 5 to 8, although *actually* it has been unchanged during the engine operation. The following table has been compiled on the lines of Table I, showing the percentage gain to be derived from complete expansion or compounding when dual combustion is adopted:

TABLE II

a	ρ	r	Limit of Expansion Volumes	Maximum Additional Power Per Cent
2	2	5	16.35	36.6
3	2	5	21.9	44.6
2	3	5	24.5	66.2
3	3	5	32.85	75.4

These gains are, of course, subject to diminution from various causes, some pointed out and allowed for by Mr. Napier himself in a revised table. As relative figures, however, they give

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some idea of the possibilities of duel combustion. At the same time it must be borne in mind that the values of α and ρ depend upon the amount of fuel which can be burned, and hence upon the amount of air available for combustion in the cylinder. This fact evidently indicates that decided advantages would accrue from a combination of the two principles of dual combustion and supercharging.

(*Continued from page* 129)

Insurance for Aviators

In the early part of the year 1917 the committee took up the question of insurance for aviators, and after correspondence with various life and accident insurance companies in the United States, it suggested to Congress, the War, Treasury, and Navy Departments the advisability of undertaking at an early date the insurance of aviators or some form of financial cooperation with the insurance companies that would enable them to write insurance at rates possible to the insured.

Aeroplane Design—Aeroplane Materials—Steel for Aeroplane Construction

The committee has cooperated with the Aircraft Production Board in connection with a wide variety of problems relating to the design, specifications, and tests of aircraft. The committee has now in hand (November, 1917) a most important investigation on the use of steel for aeroplane construction and is supervising the development of a design for construction in steel, to be later subject to a program of tests intended to show the possibilities of such type of construction.

In connection with the subject of the materials for aeroplane construction, the committee has given its attention chiefly to the investigation of strut forms for aeroplanes, the strength of spruce spars, and the development of cotton aeroplane fabrics as a substitute for Irish linen.

In the field of power-plant design and construction for aircraft, the committee has cooperated with the Bureau of Standards in the design, construction, equipment, and operation of a large vacuum chamber engine testing laboratory which is intended to reproduce the conditions of aeronautic engines operating at high altitudes. This equipment has been installed with special reference to the development and improvement of the "Liberty" engine, and important investigations bearing on this problem are now being carried forward. The committee has also carried on a number of researches on the subject of radiator design and proportion, carburetor design and adjustment, ignition apparatus, and is continuing its study of the problem of an aeroplane engine muffler.

Tests on Liberty Engine

At the request of the War Department, the committee loaned one of the members of its technical staff for the supervision of tests on the first Liberty engines at Detroit, Pikes Peak, and elsewhere, to determine their mechanical and thermal efficiency and the power delivery of the engines at various altitudes.

Aeroplane Instruments

The committee has undertaken important investigations relating to the development of various instruments used in the navigation of aircraft and in testing aircraft in free flight. In particular, there has been developed an improved form of geographic position indicator which will be of special value in connection with certain free flight tests under consideration.

Aircraft Communications

Regarding the subject of aircraft communications, the committee has cooperated in the development of a generator for wireless sending from aeroplanes and intended to satisfy the requirements of the Army and Navy. Means for receiving wireless signals in an aeroplane have also been investigated, and it has been established that a very efficient receiving set employing the sound method is practicable; investigations are still being carried on regarding means for detecting hostile aeroplanes before they are visible or before they can be heard by the unaided ear.

Mapping from Aeroplanes

On March 8, 1917, the committee took under consideration the development of methods for mapping from aeroplanes which should be rapid, economical, and sufficiently accurate for aviation purposes. Allotments were made for developing a new type of aeroplane mapping camera and gratifying progress has been made in the development of such an instrument. Before regular navigation of the air can be undertaken, it will be necessary to supply maps and to establish and suitably mark aerial routes and suitable landing places for the aviator. In certain sections of the country and through the generous cooperation of patriotic citizens interested in this work, gratifying progress has been made in these directions, notably between Dayton, Ohio, and Rantoul, Ill.

Aeroplanes Transport Troops for First Time

Washington.—Announcement was made on Sept. 21 at the War Department that for the first time soldiers under orders for duty have been transported in the United States by the air route.

On Saturday, Sept. 7, eighteen enlisted men were passengers in aeroplanes piloted by officers and the aeroplanes in formation of three, four and five ships carried the men from Chanute Field, Rantoul, to Champaign, Ill., where the men had been ordered to report at the United States School of Military Aeronautics, University of Illinois.

Navy Aeroplane Base at Galveston

Galveston.—As a result of a revision of the plans of the Navy Department for the construction of a naval air station here the total cost of the improvements will be more than three million dollars, or nearly double the original estimate. The proposed plant will consist of nine large hangars, repairshops, officers' and student aviators' quarters, barracks and medical quarters, for the accommodation of approximately 1,200 men. Of this number about 1,000 will be ground men and mechanics, 100 officers and 150 student aviators.

Each of the nine hangars will be 104 x 105, and will accommodate four machines. The first plans considered by the Navy Department called for six hangars and twenty-four sea-planes.

The site is 60 acres, between the railroad tracks leading out of the city and the bay. Three hundred and fifty thousand yards of dredging will be required for the work. Around the front and two sides of the 5-ft. elevation will be built a wooden bulkhead and an earthen levee around the back or south end. From 4,800 to 4,900 lineal feet of bulkheading, or filling material, will be required for filling in the dredged-in portion of the property. The basin will be dredged to a depth of 5 ft. the entire length of the building for a take-off, which will be 200 ft. in length. Construction will begin immediately.

Newspaper Started at Camp John Wise

The Balloon Pilot, the new weekly publication for Camp John Wise, has made its initial appearance. It is an eight-page paper. The aim of the management is to publish news of Camp John Wise and surrounding military fields, in the belief that the men will support a worthy paper.

Lieut. Harold R. Hall is editor, Lieut. H. S. Shultz, business manager, and Sergt. R. J. Kanawyer, advertising manager.

(*To be continued*)

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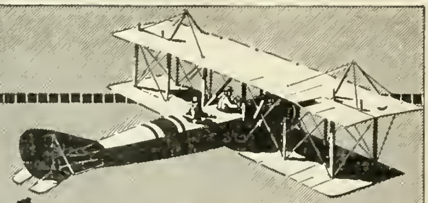

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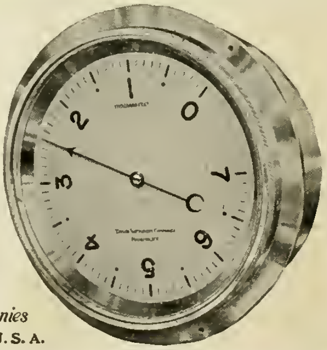

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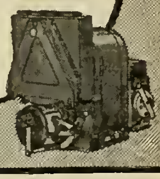

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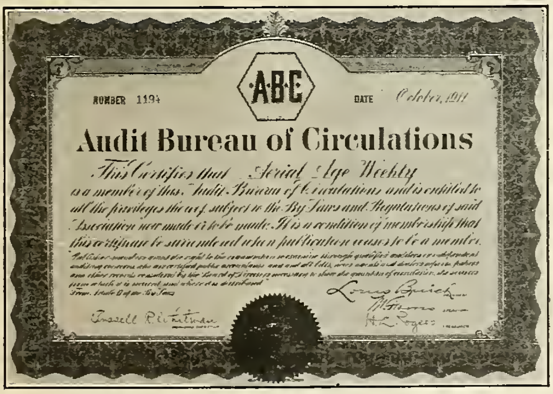

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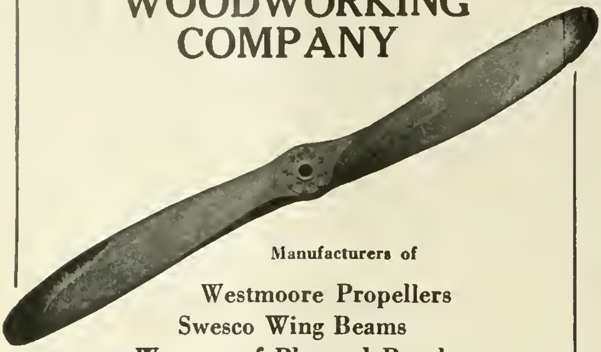

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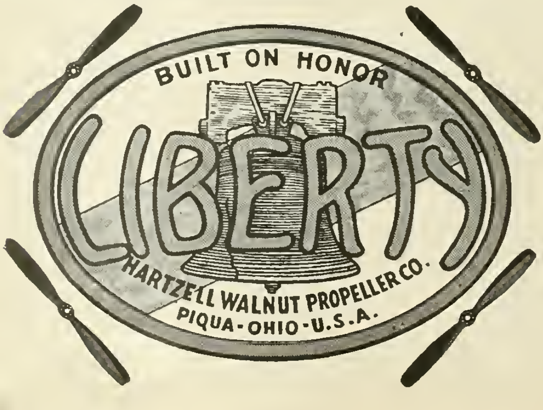
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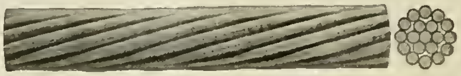

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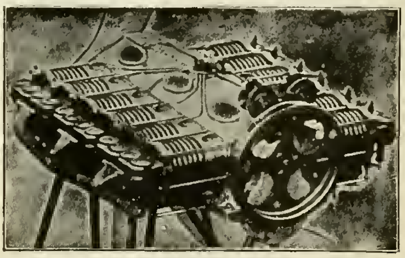

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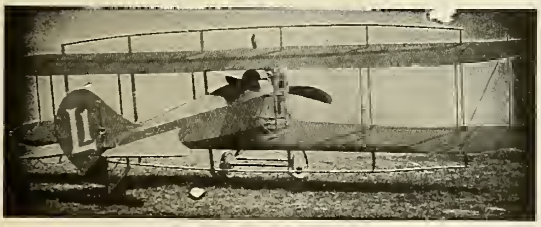

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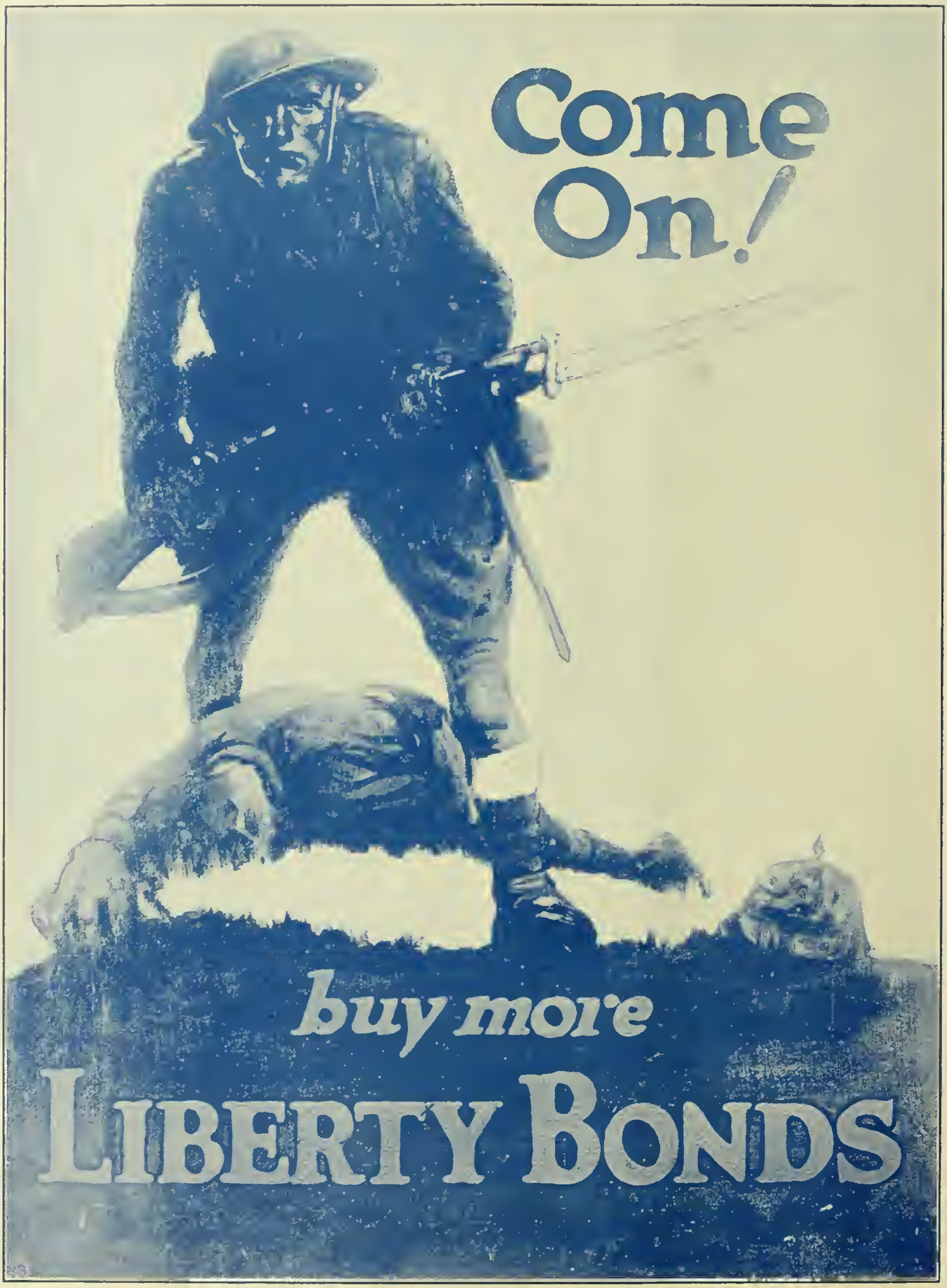

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AERIAL AGE WEEKLY

Vol. 8, No. 4 OCTOBER 7, 1918 10 CENTS A COPY

The New Jersey Reserves passing in review before Governor Edge on the occasion of their first official outing. An army plane hovering overhead lends a realistic touch to the scene

PUBLISHED WEEKLY BY THE AERIAL AGE CO., INC.
Foster Bldg., Madison Ave. and
Fortieth Street, New York City.
Subscription: Domestic, $4; Foreign, $6.
Entered as second-class matter March 25, 1915, at the Post Office at New York, under the act of March 3rd, 1879.

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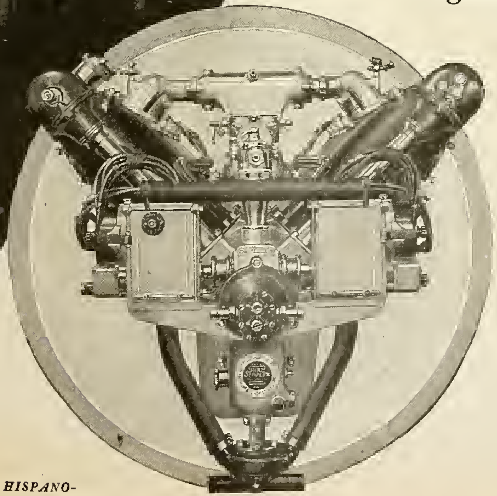

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4. This style of RESISTAL EYETECTS is our "N. A. K." and is the goggle favorably recommended for Army use by the Medical Research Laboratory, June 20, 1918.

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Uncle Sam, We Are Here!

WHEN Uncle Sam finally saw the importance of striking Germany through the air, in the Summer of 1917, and he wanted to place orders for about 25,000 aeroplanes, 40,000 motors, and the necessary equipment to build a real Air Service, he looked around and found a very meager aeronautic industry—meager because there had never been enough business on which to develop.

Then Uncle Sam called on the other industries for help and their answer was like General Pershing's answer when he landed in France. General Pershing said: "Lafayette, we are coming." The industries said: "Uncle Sam, we are coming."

On July 14th, 1918, General Pershing went to Lafayette's grave and said simply "Lafayette, we are here!" Only four words, but much more eloquent than a book.

Now that American battleplanes equipped with Liberty and Hispano Suiza Engines are actually helping the Allies' Advance, and, as the War Department announces, 6,600 training planes and 12,500 training engines have been produced, the Aeronautic Industry can say: "Uncle Sam, we are here!"

Believing that there is no better way of carrying this idea "across" than to paraphrase General Pershing's statements, as above, Aerial Age will issue a special number on October 21st, to be called the **"Uncle Sam, we are here"** Number.

In this number we will give a review of the status of the Aeronautic Industry and of the splendid outlook for quantity production. This number carries out the policy of President Wilson to do everything possible to cheer up our Allies and cast gloom in Germany, by showing that Uncle Sam is in this fight to win and that he is getting into a state of production and will soon be in a position to strike with both fists as well as with both feet.

Your firm is one of those who can say: "Uncle Sam, we are here."

Put the punch behind your advertising copy, and have it in our hands not later than October 14th, and we will do the rest.

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Managing Editor,
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Ball, Roller, Thrust, Combination Bearings

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AERIAL AGE WEEKLY

VOL. VIII OCTOBER 7, 1918 No. 4

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WHEN THE GLORIOVS DAWN OF VICTORY COMES AND THE TRVE STORY OF THE WAR CAN BE TOLD, IT WILL BE FOVND THAT CVRTISS AEROPLANES AND CVRTISS MEN HAVE "DONE THEIR BIT."

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VOL. VIII NEW YORK, OCTOBER 7, 1918 NO. 4

PRESIDENT WILSON SPEAKS FOR LIBERTY LOAN

President Addresses Huge Audience at Metropolitan Opera House

MY FELLOW CITIZENS—I am not here to promote the loan. That will be done—ably and enthusiastically done—by the hundreds of thousands of loyal and tireless men and women who have undertaken to present it to you and to our fellow citizens throughout the country; and I have not the least doubt of their complete success; for I know their spirit and the spirit of the country. My confidence is confirmed, too, by the thoughtful and experienced co-operation of the bankers here and everywhere, who are lending their invaluable aid and guidance. I have come, rather, to seek an opportunity to present to you some thoughts which I trust will serve to give you, in perhaps fuller measure than before, a vivid sense of the great issues involved, in order that you may appreciate and accept with added enthusiasm the grave significance of the duty of supporting the Government by your men and your means to the utmost point of sacrifice and self-denial. No man or woman who has really taken in what this war means can hesitate to give to the very limit of what they have, and it is my mission here to tonight to try to make it clear once more what the war really means. You will need no other stimulation or reminder of your duty.

War Itself Makes Aims Clear

At every turn of the war we gain a fresh consciousness of what we mean to accomplish by it. When our hope and expectation are most excited we think more definitely than before of the issues that hang upon it and of the purposes which must be realized by means of it. For it has positive and well defined purposes which we did not determine and which we cannot alter. No statesman or assembly created them; no statesman or assembly can alter them. They have arisen out of the very nature and circumstances of the war. The most that statesmen or assemblies can do is to carry them out or be false to them. They were perhaps not clear at the outset, but they are clear now. The war has lasted more than four years and the whole world has been drawn into it. The common will of mankind has been substituted for the particular purposes of individual states. Individual statesmen may have started the conflict, but neither they nor their opponents can stop it as they please. It has become a peoples' war, and peoples of all sorts and races, of every degree of power and variety of fortune, are involved in its sweeping processes of change and settlement. We came into it when its character had become fully defined and it was plain that no nation could stand apart or be indifferent to its outcome. Its challenge drove to the heart of everything we cared for and lived for. The voice of the war had become clear and gripped our hearts. Our brothers from many lands, as well as our own murdered dead under the sea, were calling to us, and we responded, fiercely and of course.

The air was clear about us. We saw things in their full, convincing proportions as they were, and we have seen them with steady eyes and unchanging comprehension ever since. We accepted the issues of the war as facts, not as any group of men either here or elsewhere had defined them, and we can accept no outcome which does not squarely meet and settle them. Those issues are these:

Shall the military power of any nation or group of nations be suffered to determine the fortunes of peoples over whom they have no right to rule except the right of force?

Shall strong nations be free to wrong weak nations and make them subject to their purpose and interest?

Shall peoples be ruled and dominated, even in their own internal affairs, by arbitrary and irresponsible force or by their own will and choice?

Shall there be a common standard of right and privilege for all peoples and nations or shall the strong do as they will and the weak suffer without redress?

Shall the assertion of right be haphazard and by casual alliance or shall there be a common concert to oblige the observance of common rights?

There Can Be No Peace by Bargain

No man, no group of men, chose these to be the issues of the struggle. They are the issues of it, and they must be settled—by no arrangement or compromise or adjustment of interests, but definitely and once for all and with a full and unequivocal acceptance of the principle that the interest of the weakest is as sacred as the interest of the strongest.

This is what we mean when we speak of a permanent peace, if we speak sincerely, intelligently and with a real knowledge and comprehension of the matter we deal with.

We are all agreed that there can be no peace obtained by any kind of bargain or compromise with the governments of the Central Empires, because we have dealt with them already and have seen them deal with other governments that were parties to this struggle, at Brest-Litovsk and Bucharest. They have convinced us that they are without honor and do not intend justice. They observe no covenants, accept no principle but force and their own interest. We cannot "come to terms" with them. They have made it impossible. The German people must by this time be fully aware that we cannot accept the word of those who forced this war upon us. We do not think the same thoughts or speak the same language of agreement.

It is of capital importance that we should also be explicitly agreed that no peace shall be obtained by any kind of compromise or abatement of the principles we have avowed as the principles for which we are fighting. There should exist no doubt about that. I am, therefore, going to take the liberty of speaking with the utmost frankness about the practical implications that are involved in it.

If it be in deed and in truth the common object of the governments associated against Germany and of the nations whom they govern, as I believe it to be, to achieve by the coming settlements a secure and lasting peace, it will be necessary that all who sit down at the peace table shall come ready and willing to pay the price, the only price, that will procure it, and ready and willing also to create in some virile fashion the only instrumentality by which it can be made certain that the agreements of the peace will be honored and fulfilled.

That price is impartial justice in every item of the settlement, no matter whose interest is crossed, and not only impartial justice but also the satisfaction of the several peoples whose fortunes are dealt with. That indispensable instrumentality is a league of nations formed under covenants that will be efficacious. Without such an instrumentality, by which the peace of the world can be guaranteed, peace will rest in part upon the word of outlaws and only upon that word. For Germany will have to redeem her character, not by what happens at the peace table but by what follows.

And, as I see it, the constitution of that league of nations and the clear definition of its objects must be a part, is in a sense the most essential part, of the peace settlement itself. It cannot be formed now. If formed now it would be merely a new alliance confined to the nations associated against a common enemy. It is not likely that it could be formed after the settlement. It is necessary to guarantee the peace, and the peace cannot be guaranteed as an afterthought. The reason, to speak in plain terms again, why it must be guaranteed is that there will be parties to the peace whose promises have proved untrustworthy, and means must be found in connection with the peace settlement itself to remove that source of insecurity. It would be folly to leave the guarantee to the subsequent voluntary action of the governments we have seen destroy Russia and deceive Rumania.

No Economic Boycott; All Treaties Public

But these general terms do not disclose the whole matter. Some details are needed to make them sound less like a thesis and more like a practical programme. These then are some of the particulars, and I state them with the greater confidence because I can state them authoritatively as representing this Government's interpretation of its own duty with regard to peace:

First, the impartial justice meted out must involve no discrimination between those to whom we wish to be just and those to whom we do not wish to be just. It must be a justice that plays no favorites and knows no standard but the equal rights of the several peoples concerned;

Second, no special or separate interest of any single nation or any group of nations can be made the basis of any part of the settlement which is not consistent with the common interest of all;

Third, there can be no leagues or alliances or special covenants and understandings within the general and common family of the league of nations;

Fourth, and more specifically, there can be no special, selfish economic combinations within the league and no employment of any form of economic boycott or exclusion except as the power of economic penalty by exclusion from the markets of the world may be vested in the league of nations itself as a means of discipline and control.

Fifth, all international agreements and treaties of every kind must be made known in their entirety to the rest of the world.

Special alliances and economic rivalries and hostilities have been the prolific source in the modern world of the plans and passions that produce war. It would be an insincere as well as an insecure peace that did not exclude them in definite and binding terms.

The confidence with which I venture to speak for our people in these matters does not spring from our traditions merely and the well known principles of international action which we have always professed and followed. In the same sentence in which I say that the United States will enter into no special arrangements or understandings with particular nations let me say also that the United States is prepared to assume its full share of responsibility for the maintenance of the common covenants and understandings upon which peace must henceforth rest. We still read Washington's immortal warning against "entangling alliances" with full comprehension and an answering purpose. But only special and limited alliances entangle, and we recognize and accept the duty of a new day in which we are permitted to hope for a general alliance which will avoid entanglements and clear the air of the world for common understandings and the maintenance of common rights.

I have made this analysis of the international situation which the war has created not, of course, because I doubted whether the leaders of the great nations and peoples with whom we are associated were of the same mind and entertained a like purpose, but because the air every now and again gets darkened by mists and groundless doubtings and mischievous perversions of counsel and it is necessary once and again to sweep all the irresponsible talk about peace intrigues and weakening morale and doubtful purpose on the part of those in authority utterly, and if need be unceremoniously, aside and say things in the plainest words that can be found, even when it is only to say over again what has been said before, quite as plainly if in less unvarnished terms.

As I have said, neither I nor any other man in governmental authority created or gave form to the issues of this war. I have simply responded to them with such vision as I could command. But I have responded gladly and with a resolution that has grown warmer and more confident as the issues have grown clearer and clearer. It is now plain that they are issues which no man can pervert unless it be wilfully. I am bound to fight for them, and happy to fight for them as time and circumstance have revealed them to me as to all the world. Our enthusiasm for them grows more and more irresistible as they stand out in more and more vivid and unmistakable outline.

Masses Know What They Are Fighting For

And the forces that fight for them draw into closer and closer array, organize their millions into more and more unconquerable might, as they become more and more distinct to the thought and purpose of the peoples engaged. It is the peculiarity of this great war that while statesmen have seemed to cast about for definitions of their purpose and have sometimes seemed to shift their ground and their point of view, the thought of the mass of men, whom statesmen are supposed to instruct and lead, has grown more and more unclouded, more and more certain of what it is that they are fighting for. National purposes have fallen more and more into the background and the common purpose of enlightened mankind has taken their place. The counsels of plain men have become on all hands more simple and straightforward and more unified than the counsels of sophisticated men of affairs, who still retain the impression that they are playing a game of power and playing for high stakes. That is why I have said that this is a peoples' war, not a statesmen's. Statesmen must follow the clarified common thought or be broken.

I take that to be the significance of the fact that assemblies and associations of many kinds made up of plain workaday people have demanded, almost every time they came together, and are still demanding, that the leaders of their governments declare to them plainly what it is, exactly what it is, that they were seeking in this war, and what they think the items of the final settlement should be. They are not yet satisfied with what they have been told. They still seem to fear that they are getting what they ask for only in statesmen's terms—only in the terms of territorial arrangements and divisions of power, and not in terms of broad visioned justice and mercy and peace and the satisfaction of those deep seated longings of oppressed and distracted men and women and enslaved peoples that see into them the only things worth fighting a war for that engulfs the world. Perhaps statesmen have not always recognized this changed aspect of the whole world of policy and action. Perhaps they have not always spoken in direct reply to the questions asked because they did not know how searching those questions were and what sort of answers they demanded.

World Wants Triumph of Justice

But I, for one, am glad to attempt the answer again and again, in the hope that I may make it clearer and clearer that my one thought is to satisfy those who struggle in the ranks and are perhaps above all others, entitled to a reply whose meaning no one can have any excuse for misunderstanding if he understands the language in which it is spoken or can get some one to translate it correctly into his own. And I believe that the leaders of the governments with which we are associated will speak, as they have occasion, as plainly as I have tried to speak. I hope that they will feel free to say whether they think that I am in any degree mistaken in my interpretation of the issues involved or in my purpose with regard to the means by which a satisfactory settlement of those issues may be obtained. Unity of purpose and of counsel are as imperatively necessary in this war as was unity of command in the battlefield; and with perfect unity of purpose and counsel will come assurance of complete victory. It can be had in no other way. "Peace drives" can be effectively neutralized and silenced only by showing that every victory of the nations associated against Germany brings the nations nearer the sort of peace which will bring security and reassurance to all peoples and make the recurrence of another such struggle of pitiless force and bloodshed forever impossible, and that nothing else can. Germany is constantly intimating the "terms" she will accept, and always finds that the world does not want terms. It wishes the final triumph of justice and fair dealing.

AERO CLUB OF AMERICA TO HAVE CLUB FOR ALLIED AVIATORS IN PARIS

At a special meeting of the Executive Committee of the Aero Club of America, held September 30, at the clubhouse, 297 Madison Avenue, the club accepted the offer made by a prominent, wealthy, American in Paris, to establish a club for Allied aviators, to be maintained at his own expense for the Aero Club of America for the period of the war.

Recently the Aero Club of America was advised by the military authorities that there was pressing need for a home or club for tired aviators.

The Foreign Service Committee of the Aero Club of America, of which Ambassador William G. Sharp is Honorary Chairman, the membership of which included the most prominent Americans who reside in Paris, transmitted the information to Mr. Alan R. Hawley, the President of the Aero Club of America, and it arrived two days ago. Yesterday the club received a cable from the Foreign Service Committee in Paris, advising that Mr. Louis D. Beaumont, who is President of the May Department Stores Company of Cleveland, Ohio,

(Continued on page 190)

THE NEWS OF THE WEEK

American Caproni Gives Newspapermen Demonstration

The first all-American Caproni bombing biplane equipped with three Liberty motors flew over New York and Brooklyn just previous to the opening of the Liberty Loan Drive on September 27.

The biplane, piloted by Lieut. Giuliano Parvis, an Italian fighting pilot, recently arrived in this country, and Capt. Hugo d'Annunzio, son of the famous Italian poet of that name.

The captain is mechanical chief of the Caproni company, and he supervised the building of the plane.

As passengers these two had nine newspapermen, including two photographers.

The plane left the ground at Hazelhurst Field, Mineola, L. I., at 4:30 P. M., and it was just 5:45 when, after a thrilling corkscrew spiral from 4,000 feet in the air, it alighted gently within a couple of hundred yards of where it had started.

A good part of New York must have seen—and heard—the new American air monster. Briefly, the route was this: from Hazelhurst Field directly to New York, crossing the East River between the Manhattan and Williamsburg Bridges. Down the west side of Manhattan, out over the bay, circled twice above the Statue of Liberty, did a dive just after that, from 4,000 feet down to about 1,500; then went back over the city, keeping above Broadway and Fifth Avenue, to a point over the sheep meadow of Central Park, then down town again, directly above The World and Municipal Buildings and City Hall Park, then back up over Third and Fourth Avenues as far as the Queensboro Bridge, and thence eastward over Brooklyn and back to the starting point.

Speaking of the flight, one of the passengers, J. J. O'Neill, of the New York *World*, said:

"It seemed to all of us a very good thought that America now has a native-built plane, foreign though the design may be, that is capable of bombing the enemy's works or cities, that has the speed and strength to do it, that CAN do it, and it is to be hoped, SHALL do it.

"In addition to making a wonderfully successful demonstration of what this all-American machine can do we broke several records on the flight.

"In the first place, we reached a height of 2,700 metres—8,858 feet—with twelve persons, which is a new American altitude mark for any sort of machine carrying that number of persons. This high mark was attained just as we were coming upon the outskirts of Brooklyn (and a genial soul sitting next to me pointed down to the cluster of cemeteries beneath).

"Then we established a new record of a novel sort which was quite as interesting. This was a "low altitude" record. That is to say, we flew over the City of New York at a lower stage than any aeroplane of any sort had flown previously. The baragraph showed that we came down to within 200 metres—600 feet, roughly speaking—of the sidewalks. This was when we were passing close by the Metropolitan Tower at 23d Street and Madison Avenue.

"We were actually lower than the top of the tower as we swung along northward above Third Avenue. This was rather risky business, as the pilots cheerfully told us when we foregathered afterward on terra firma, but they wanted to show us, they said, that the plane could go anywhere."

New York Air-Raided by Liberty Planes

A novel air raid on New York City was carried out by the Italian and French aces on Saturday, September 28, for the Liberty Loan.

Capt. Jacques Boyriven and Lieut. Georges Flachaire, under the direction of Major Beroetta, of the French Aviation Mission to the United States, flew two fast Nieuport combat biplanes which were used at the recent Somme front by famous French aces, and which arrived in the United States recently. Lieut. Julian Parvis, the famous Italian ace, piloted the new American-made Caproni, which is equipped with three Liberty motors. His passengers were Capt. Hugo d'Annunzio, son of the noted Italian poet and aeroplane observer, and Lieut. Testoni. The Italian officers acted under the direction of Capt. Bevione of the Italian Aviation Mission.

The Caproni and the two Nieuports started from Mineola at five o'clock in the afternoon on September 28 and flew to New York.

The large Caproni represented a bombing machine starting out for a long bombing raid, and the two Nieuports served as escorts, and flew over it and around it as they would at the front if they had to protect it from the attack of the enemy fighting planes.

They flew to New York, and on arriving over Riverside Drive, the Caproni manoeuvred as it would in a raid, dropping bombs, and the Nieuport combat planes went through all the difficult stunts and turns which combat planes have to go through when fighting a large number of enemy planes.

Lieut. George Flachaire, the French Ace, who has spent some months in this country, and flew for the Fourth Liberty Loan. He was a pilot in the 67th Escadrille

Thirty thousand "aerograms," or paper bombs, were dropped by the aviators over New York City. Half of the bombs read:

WE HAVE FOUGHT FOR DEMOCRACY FOR FOUR YEARS!
HELP US WIN THE WAR
BUY LIBERTY BONDS!

These bombs will be dropped by French aviators from fighting Nieuports.

The other half bore the same legend but stated that they were dropped by Italian aviators from the Caproni bombing aeroplane, equipped with Liberty motors.

After bombing New York the planes gave an exhibition of the newest phases of aerial warfare, which is flying low and attacking enemy troops on the ground and in the trenches. To best demonstrate how the planes can fly low and get in and out of tight places, they flew under all the New York bridges.

The French and Italian aviators are very enthusiastic over the Liberty Loan, and they told the Aero Club of America authorities, Mr. Alan R. Hawley, President; Henry A. Wise Wood, Vice-President; and Rear Admiral B. A. Fiske and Henry Woodhouse, Members of the Board of Governors, that nothing would *encourage* the Allied forces, nor *discourage* the enemy more, than the overwhelming success of the Fourth Liberty Loan.

Aeroplane Assembly System Incorporated in Training Course

Washington.—A system of aeroplane assembly has been incorporated with the general training course at Kelly Field, Texas, for both cadets and student officers. This is a departure from the general curriculum, is not general and has not yet been approved by the training section. At present the work includes 12 days of instruction in putting together wings and fuselage only. The other parts of the plane will enter into instruction as the course advances, until the practical assembling of a complete aeroplane is a part of the instruction of every flier. It is expected that this will prevent carelessness, tendency to hurry the work or to overlook anything that may later endanger life. It will take the prospective flier completely through all the shops.

1,000 Planes Have Gone to Pershing

Washington.—A total of 1,440 De Haviland 4 aeroplanes have been delivered and 1,000 have been sent to France, members of the House Committee on Military Affairs were told at their weekly conference with Gen. Peyton C. March, Chief of Staff on September 27. All the Browning machine guns that can be utilized have been furnished, but it has been impossible as yet to build up a reserve sufficiently large for the requirements.

Photo shows, left to right, Colonel Milton F. Davis and Lieutenant-Colonel Mallard F. Harmon. Colonel Davis is in charge of all the training of the American flyers. He is engaged in hammering into shape the team that is going to demoralize the Huns as soon as they are ready to swarm across the German frontier. Lieut.-Colonel Harmon has just returned from the Western battle front, where he had charge of the American flyers. These two officers are playing a prominent part in the creation of an arm of the service that is destined to strike terror into the hearts of the Huns

A Nieuport biplane, which escorted the Caproni bomber on its Liberty Loan bombing expedition. Those aviators shown in the photograph flew for the Liberty Loan. They are, from left to right, Major Phipps, U. S. Air Service; Lieutenant Maadrot, French Air Service; Lieut.-Col. C. K. Rhinehardt, Commander of the 1st Provisional Wing, U. S. Air Service; Captain Boyriven, French Air Service, Instructor on Nieuport, Spad and other combat machines; Adjutant Ravis and Adjutant Royer. The Nieuport advanced training biplane, shown in the photograph, is Colonel Rhinehardt's machine, "Billiken". Captain Boyriven's clever Boston Terrier is shown on the cowl of the machine

Lieut. Campbell Shares in Prize

Lieut. Douglass Campbell of California, the first American-trained aviator to be officially cited as an ace, has been awarded part of the 10,000 francs offered jointly by the Duke and Duchess of Talleyrand and Curtiss Tilton of Philadelphia to the first five American aviators to down three Hun planes.

Others who will share in the awards will be Lieuts. Eddie Rickenbacher, John Mitchell and Sumner Sewall.

Lieut. Campbell filed his claim for the monetary prizes before he left Paris for San Diego. According to the rules, the prizes were open to aviators who went overseas with the first American forces. Veteran airmen who had heen transferred to the American Air Service from other Allied branches were not eligible.

Campbell crasbed his first Boche aeroplane near Toul on April 14 last, his second on May 18 and the third on May 19. Sewall destroyed his first Hun machine on June 3, his second July 16, and the third on July 25. Mitchell is credited with victories on May 27, May 30, and July 8. Rickenbacher downed his three between July 5 and August 2.

Lieut. Campbell left Rockwell Field the early part of this week for a short visit at his home in San Jose. He will return at an early date.—*Rockwell Field Flight.*

New Identification Mark

From a German source the *Nieuwe Rotterdamsche Courant* learns that a change has been made in the marking on German machines. The arms of the black cross are now straight—and not curved—with white edges. The change is said to have been made because the previous form made recognition of German machines very difficult, and because it easily led to confusion with the circular signs on hostile aeroplanes.—*March Field Flyleaf.*

Aero Estimate Cut

The House Appropriations Committee today pared $1,000,000 from the maintenance and production item of the $170,000,000 aircraft estimate included in the $7,000,000,000 asked for by the War Department for its new man-power program.

The $1,000,000 was taken off after Chairman Sherley had elicited the information from War Department representatives who appeared before the committee that certain items in the maintenance and production estimates were also provided for in the quartermasters' and other departmental estimates.

Licenses for Air Flights

Licenses must be secured for experimental aeroplane flights, even at plants manufacturing planes for the army and navy, under a ruling announced on September 23 by the joint army and navy aeronautics board.

Flyer's Digits Freeze

Canton, Ohio.—What is thought by Capt. R. W. Schroeder, of Chicago, to be very nearly a new record in altitude was achieved by him in a test aeroplane flight from the Dayton aviation field to Canton. He ascended more than 28,000 feet, bis records show. He found a temperature of 32 degrees below zero centigrade. His finger tips were frozen.

Joseph Pulitzer Joins Aero School

Chicago.—Joseph Pulitzer, editor of the St. Louis *Post-Dispatch* and director of the New York World Corporation, has enrolled in the aviation training school at Great Lakes naval training station, and bas been given a temporary rating as chief quartermaster.

Calls Our Airmen Equal to British

With the American Army in France.—In the course of a statement on the extent and importance of the work of the British independent air force, Major Gen. Trenchard, its commander, spoke in highest praise of the American airmen. He said they were as good as his own men, and more praise he could not give, as he did not believe anything better could be said.

Their daring, ability, discipline, and organization could hardly by improved upon, said General Trenchard. He added that he recently bestowed the distinguished Flying Cross to an American airman.

Among some captured German letters that General Trenchard quoted was one describing the destruction wrought by Allied aircraft. This said that the Opera House and the greater part of the splendid street, "Die Zieh," in Frankfort was a heap of ruins and that 120 persons had been killed.

New Quick-Dodging Plane Used by Enemy

American Headquarters in France.—Patrols report having encountered an entirely new type of enemy aeroplane, designed especially to make it easy to manoeuvre. They also report that the Germans are adopting tbe parachute as a means of escape from damaged planes.

British, French and Italian Flyers Join with Americans

With the American Army on the Lorraine Front.—British aeroplanes, which are cooperating with American squadrons on this front, flew far back of the enemy lines on September 16 and bombed aerodromes at several places. Eleven tons of bombs were dropped on aerodromes at Longuyon, Boulay, Marhange and Bohm.

French and Italian units cooperated with American squadrons in carrying out nine missions, in addition to which patrolling and photographic work was successfully conducted.

The American-made Caproni which bombed New York from the skies with leaflets in aid of the Fourth Liberty Loan is equipped with three Liberty motors. It was piloted by Lieutenant Parvis, the noted Italian Ace, with Captain d'Annunzio and Lieutenant Belloni as passengers.

The AIRCRAFT TRADE REVIEW

Standard Inspectors Hold Annual Dinner

The first annual dinner of the Standard Aircraft Inspectors and the United States Government Inspectors stationed at the Standard Aircraft plant at Elizabeth, was held on Saturday, September 14th, at Sea Girt, N. J.

In addition to the inspectors, a number of the officials of the company were present.

Mr. J. M. Meirick, Superintendent of Publicity, acted as toastmaster.

Mr. A. M. Jeffords, Assistant General Manager, represented the management.

Addresses were made by A. M. Jeffords; William Tynam, Chief Inspector; Fred Sinon; Harry C. Austin; etc.

The toastmaster read letters from H. B. Mingle, President of the Standard Aircraft Corporation, and Edward E. Pennewill, Vice-President and General Manager of the Standard Aircraft Corporation.

The Government Inspectors who were present at the dinner, included the following: Mr. George M. Pace, Mr. Harry Austin, Mr. Eaton, Mr. O. Kalning, Mr. August Bauer, Mr. Robert Mason, Mr. Samuel Kriney, Mr. Augustus T. Schmidt.

Among the Standard Aircraft Corporation Inspectors who were present were: Mr. Russell O. Wirtz, Mr. Ed. J. Mansfield, Mr. Anthony E. Rubino, Mr. Charles Azzara, Mr. Louis Barbier, Mr. E. M. Morel, Mr. William Lean, Mr. Duncan MacKinnon, Mr. Frank Morris, Mr. Nelson Bordeaux, Mr. Arthur Weiber, Mr. Wm. Sandford, Mr. George Keller, Mr. Clarence Daly, Mr. Harry A. Cohen, Mr. Fred Scheidegger, Mr. Frederich Wm. Sinon, Mr. Andrew Guaniello, Mr. W. H. Rittenhouse, Mr. George Rhoderick, Mr. J. Roden, Mr. John H. Lizelan, Mr. Valentine Steenson, Mr. Flannery.

New Company to Build Aeroplanes

The Stacy Aeroplane Company of this city, has been granted incorporation papers by the Secretary of State.

This company has been organized by Charles E. Stacy and will manufacture aeroplanes with the use of patents owned by him and C. D. Stacy, his brother. The work of organizing the company will start at once and definite plans of operation will be announced in the near future.

Both brothers are engineers and machinists of experience, at present being employed by local firms.—Dayton *Evening Herald.*

Wings of German Aeroplanes Now Being Made of Wood

The Hague.—The New York *Times* correspondent learns on excellent authority that the last German aeroplane to land in Holland was one of the Brandenburg type, which had wings covered with three thin layers of wood instead of textile material. The extra weight was saved by doing away with wire stays. The machine flew well.

Graham W. Brogan, newly appointed advertising manager of the Duesenburg Motor Corporation

The question of textiles and, in fact, of all materials has been one fraught with tremendous difficulties to Germany for some time and is one that monopolizes the attention of the experts, in spite of efforts to prove the contrary.

Automobile Shows Cancelled Because of War Exigencies

B. M. Baruch, chairman of the War Industries Board, authorizes the following:

The National Automobile Chamber of Commerce has canceled the national automobile shows of 1919, to have been held during January and February in New York and Chicago, at the request of Bernard M. Baruch, chairman of the War Industries Board, and George N. Peek, commissioner of finished products.

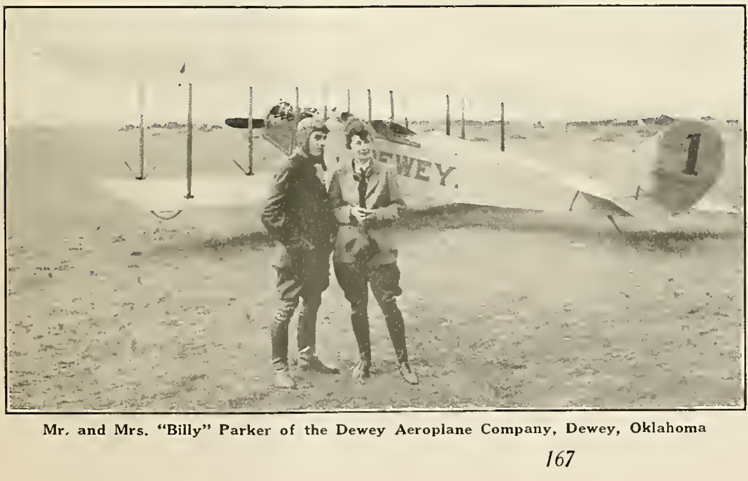
Going further to meet the views of the War Industries Board, the automobile industry leaders have urged promoters of local shows for automobiles, trucks, or accessories to abandon all plans for such during the coming winter.

The reason given to the industry for this action by the Automobile Chamber of Commerce is a desire to co-operate with the War Industries Board in plans for conservation of fuel, labor and transportation.

The question of advisability and practicability of holding these shows, both national and local, was taken up with Messrs. Baruch, Peek, Alexander Legge and Judge Edwin B. Parker, of the War Industries Board, by Hugh Chalmers and Alfred Reeves, of the National Automobile Chamber of Commerce, and Mr. Peek strongly urged that all such exhibitions be abandoned for the winter. Mr. Chalmers presented the views of the War Industries Board to his chamber of commerce and Mr. Peek has received from Mr. Reeves, general manager of the chamber, a letter stating that the directors of the chamber concurred unanimously in the opinion of the board and has adopted the following resolution:

"*Resolved,* That the promotion of national automobile shows during the winter of 1918-19, with consequent use of transportation, fuel and labor, would, in the opinion of this board, be inconsistent with the patriotic obligations of the industry and that, therefore, national shows be suspended until further action of the association.

"*Resolved,* That for reasons expressed in the foregoing resolution, promoters of local and other shows be respectfully requested not to hold automobile, truck or accessories exhibitions during the winter of 1918-19."



Mr. and Mrs. "Billy" Parker of the Dewey Aeroplane Company, Dewey, Oklahoma

Standard Fabric for Aeroplne Wings

Government tests of silk for aeroplane wings were made last year, and now there has been a cotton fabric evolved instead. It is reported that one of the largest mills in Philadelphia is virtually ready to manufacture aeroplane cloth in large volume.

The standard cloth, textile experts say, is a cotton fabric of great strength, with almost no "stretch" to it. It is regarded as equal in every way to the linen cloth used by England, although it is a trifle heavier. Mill conditions are such that orders for millions of yards can be handled with comparatively no trouble.

Ball Bearing and Steel Ball Industries Recognized as Essential

The Priorities Division of the War Industries Board, in circular No. 19, dated September 3, 1918, has placed manufacturers of ball bearings and steel balls on the Preference List with a rating of "Class B-3," conditioned upon their executing and filing pledges of co-operation with and observance of the rules of the Priorities Division.

Overland Gets Curtiss Engine Contract

Washington.—The Willys-Oevrland Co. has received a contract for 1,500 Curtiss O. X.-5 aeroplane engines of the 8-cylinder type, to be used in training planes.

Washington Office for Duesenberg

Washington.—The Duesenberg Motors Corp. has established a Washington office in the Munsey Bldg. It is in charge of General Sales Manager N. G. Rost.

Glenn L. Martin Tests First Plane

Cleveland.—The first plane produced by the Glenn L. Martin Co. has been completed and has flown from Cleveland to Dayton for experimental tests with a crew of four men.

Hon. Albert S. Burleson, Postmaster General
Hon. Otto Praeger, Second Assistant Postmaster General
Captain Benjamin B. Lipsner, Superintendent Aerial Mail Division

AERIAL MAIL PILOTS

- Max Miller
- Maurice A. Newton
- Robert Shank
- Ed. V. Gardner
- C. D. De Hart
- Louis Gertson
- R. Smith

George Langley Conner, Chief Clerk to Second Assistant Postmaster Praeger
Charles M. Kight, Special Representative
John A. Jordan, Special Representative
Frank Bowie, College Park, Md., Representative
Harry L. Hartung, Belmont Park, L. I., N. Y., Representative
H. Thomas, Bustleton, Penn., Representative

AERIAL MAIL MECHANICS

- Henry Wacker
- E. N. Angle
- A. F. Cryder
- Ed. C. Radel
- Wm. C. Read
- W. O. Beatty
- Chas. King
- J. A. Danville

Aerial Mail Scores 100%

The Aerial Mail has scored 100% daily for September, including the rainy period of the last of the month. The worst day was on September 18, when the planes left Washington and New York in the midst of rainstorms. On that day it was raining so hard that the machine had to be started in the hangar, Aviator Shank leaving Washington in a downpour of rain, the landing gear of his plane sinking in the mud up to the hubs in parts of the field and making the take-off from the ground very difficult. Notwithstanding the stormy weather, he made the trip from Washington to New York in three hours and five minutes. He flew nearly the entire distance through rain and storm and landed in rain both at Philadelphia and New York.

Aviator Max Miller on September 19 flew to Clarion Pa., to chart a more favorable route across the mountains in Pennsylvania than is found on the air line from Belmont to Cleveland.

U. S.-Spain Aero Mail Service Is Proposed

Madrid, Spain.—Captain Herrera, chief of the Spanish military air force, has had a number of interviews with King Alfonso on the subject of an aerial postal and passenger service between Spain and the United States. The scheme also has been discussed at cabinet meetings, and it is said that a leading shipping company is willing to finance it.

Will Relay New Aero Mail

New York.—The feasibility of the government's plan to transport mail by aeroplane and make final delivery of letters, between New York and Chicago within a maximum time of 10 hours, has been demonstrated, in the opinion of postal officials and officers of the Aero Club of America. This opinion was expressed after Max Miller, arriving here from Chicago by way of Cleveland and Lock Haven, completed the first round trip aero post flight between this city and Chicago.

On his journey to Chicago last week Miller, battling against adverse weather conditions at times, made the flight in an elapsed flying time of about nine hours. On his return journey, begun in Chicago, Miller consumed eight hours and 42 minutes.

Under the government's plans for a regular aero post between New York and Chicago, beginning October 1, mail will be carried in relays, three aviators carrying the mail instead of one.

Miss Stinson Again Flies Mail

Miss Katherine Stinson, who made her first trip as a member of the air mail staff on September 26, flying from Washington to Belmont Park, was ready for her second flight on September 27, and was favored with pleasant though windy weather. She got away from the Belmont Park station at 12:12 P. M. with pouches containing 150 pounds of mail, and Pilot Maurice Newton flew another plane carrying an equal amount, both starting about the same time and reaching Philadelphia at 1:22. From there they went on, after a short stop, to Washington.

Pilot Robert Shank brought in the northbound mail, making the trip from Philadelphia to Belmont Park in fifty minutes. The large volume of mail carried in the last two days is due in part to the fact that boxes with the aero mail service signs have been installed in the hotel lobbies from which collections by motorcycle are made just before the time for the dispatch of the messages to the aero mail stations.

Do You Use the Aerial Mail Service Regularly for Your Urgent Correspondence With Philadelphia and Washington? It May Interest You to Know the Following Facts

The Aerial Mail Service operates with clock-like regularity between New York and Washington.

The aeroplane leaves New York every week day without fail at 12 o'clock noon and arrives at the Philadelphia field at 1 p.m. and at the Washington field on or before 3 p.m.

Northbound, the aeroplane mail leaves Washington at 11.30 a.m. every week day without fail, arrives at Philadelphia at 1.10 p.m., and lands at the New York terminus of the route on or before 2.30 p.m.

During the month of August every foot of the route was flown without a miss and without a single serious delay. The mail from Washington to New York was late as much as one hour only once during the month, whereas the fixed schedule for arrival in New York was beaten 14 times. On August 21st the mail plane landed at 1.58 p.m. with the mail that left Washington at 11.30 a.m.

The best time from New York to Washington, including the mail stop at Philadelphia, was 2 hours and 30 minutes, and the best time from Washington to New York, including the Philadelphia stop, was 2 hours and 28 minutes.

Compare this for speed and regularity with the fastest train service between New York and Washington, which is approximately 5 hours, and about 5 hours and 30 minutes as an average for all the other fast through trains.

Compare this record with the time it takes for the transmission and delivery of the average commercial telegram. Neither train nor telegram are more regular and more certain in their delivery performances than is the aerial in any kind of weather as it is now operated by the Post Office Department.

An aeroplane letter mailed from New York is delivered to the addressee in Washington *before close of business the same day*.

Aeroplane mail receives special treatment from the time it is mailed until it is placed in the hands of the addressee.

The rate of postage is 16 cents for the first ounce, including Special Delivery Service, and 6 cents for each additional ounce.

The Postmaster can advise you as to the latest time in the forenoon that aeroplane mail may be deposited at the various stations for dispatch that same day.

Otto Praeger,
Second Assistant Postmaster General

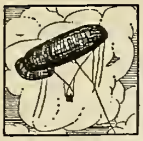
September 7, 1918

Motorcycle Schedule for Collecting Aeroplane Mail—Stations, Business District and Important Hotels, New York City

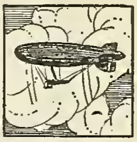
Station	*Location*	*Time of Collection*
P	Custom House Building	10.15 a. m.
Wall Street	165 Pearl Street, corner Pine Street	10.23 a. m.
Hudson Term'l	30 Church Street	10.30 a. m.
City Hall	Broadway and Park Row	10.35 a. m.
S	Northwest cor. Howard and Lafayette Sts.	10.40 a. m.
D	Southwest cor. Fourth Ave. and 13th St.	10.50 a. m.
Madison Sq	310-316 Fourth Ave., corner 23rd Street	11.00 a. m.
General P. O	Eighth Ave., 31st to 33d Streets	11.15 a. m.

Hotel	*Location*	*Time of Collection*
Astor	Broadway, 45th to 46th Streets	10.30 a. m.
Knickerbocker	Broadway and 42d Street	10.33 a. m.
Manhattan	Madison Ave., 42d to 43d Streets	10.37 a. m.
Ritz-Carlton	Madison Ave., 45th to 46th Streets	10.40 a. m.
Biltmore	Madison Ave., 43d to 44th Streets	10.45 a. m.
Belmont	Park Ave., 41st to 42d Streets	10.50 a. m.
Vanderbilt	Park Ave., 33d to 34th Streets	10.55 a. m.
Waldorf	Fifth Ave., 33d to 34th Streets	11.00 a. m.
McAlpin	Broadway, 33d to 34th Streets	11.05 a. m.

Note—Mail deposited at any one of the above points up to ten minutes before last collection is made will be dispatched same day. Mail deposited after last collection will go forward via first train and be given special-delivery service unless instructions are given to hold same until following day for dispatch via aeroplane.



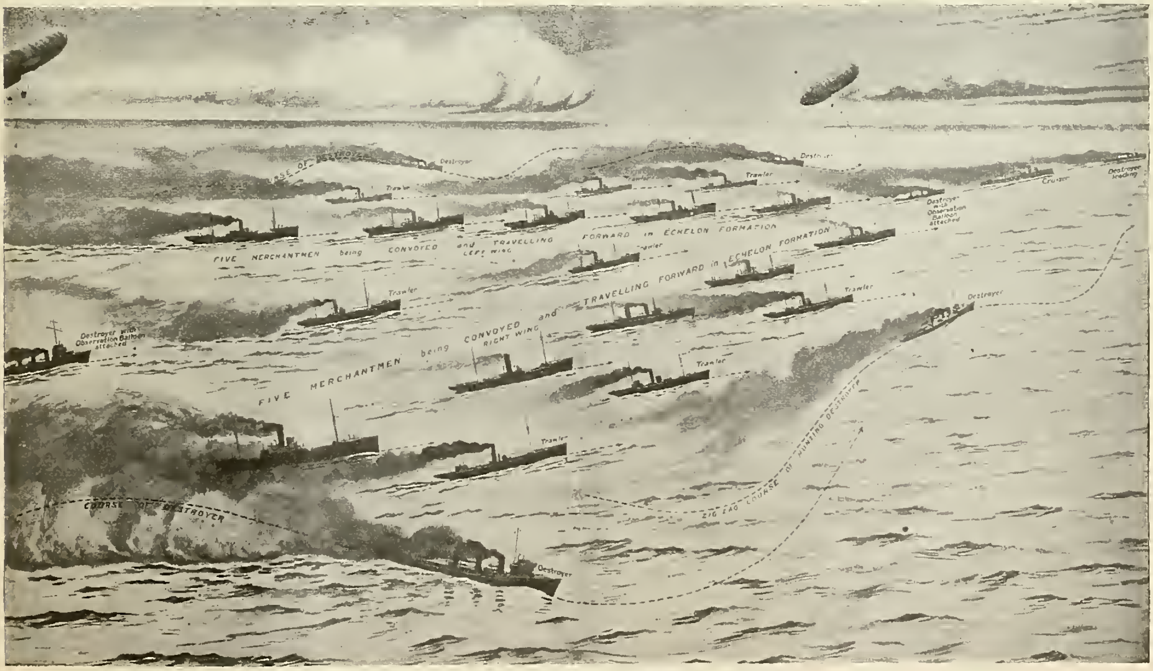
MILITARY AEROSTATICS



By LIEUT. H. K. BLACK, R. F. C., C. F. A.

SO far as the naval balloons were concerned they were housed in special balloon ships, which had a hold fitted up for the reception of the gas bags. On land it was another matter. It was almost a universal accepted theory that balloons would be houses in wooden or canvas hangars, the same as aeroplanes are at the present time. Active service and the advent of the aeroplane, however, made it evident that some new means of housing a balloon was advisable. The hangars were very easily spotted from the air and owing to their gaseous occupant were particularly vulnerable to enemy artillery fire and later to enemy incendiary bombs. Besides hangars were rather a nuisance. They were unwieldy and hard to transport. Unlike an aeroplane, which can reach the battle front in a very few minutes from its aerodromes away behind the lines, a balloon must be fairly close to the place it is going to do its work. To walk a balloon overland requires the efforts of the whole crew and a very tedious job it is. That procedure also requires an absence of overhead wires, a state of things which is very seldom the case near the front in France. In windy weather even the combined efforts of the whole crew would probably not be sufficient to take the balloon any distance safely. So events proved that a balloon must be bedded down fairly near to the winch position. As the erection of hangars so close to the enemy was impracticable, a bed on the ground was devised. Some experiments along that line had been carried out in England before the war, and these formed the basis of new experiments on active service

Several things are essential in the contructions of a good balloon bed. Probably the most important is protection. This point subdivides itself into two parts, first protection from the weather and second from the inquisitive eyes of wandering Boche airmen and ground observers. The latter are usually not very hard to circumvent, that is, given any decent kind of country. It is surprising just how much protection even a very small rise in the ground will give. So long as the ground line of where the balloon rests on the ground is not visible to the enemy it is very difficult for him to notice the balloon at more than five thousand yards. The airman is not so easy to fool. Owing to its regular more or less cylindrical shape it is unmistakable from the air. Camouflage well applied, is distinctly effective. Not the wierd color combinations which one sees so much of in this country but a quiet breaking up of the regular lines with color and a harmony with the surroundings. I remember on one occasion I was beautifully fooled and incidentally, unwittingly, caused quite a flutter in the company. While we were operating a balloon on the Arras sector just behind the one-time village of Souchez, the section on our right, for some reason or other, I forget what, got a new balloon. Instead of being a dark green as most of the balloons are colored, it was a very irregular grey. Quite mottled in fact. As the fortune of war had it, their suroundings were almost the same color, to wit, an old shell torn wood. I happened to be in the air one day when a message came through asking if Number —was in the air. I cast a glance over my shoulder and failed to see the sausage up. For no particular reason I glanced at the ground to see the balloon on its bed. I did not know they had received a new balloon and I didn't see it lying there. I reported that Number — was not only not in the air but that the balloon was not visible on the ground either and that probably it had blown off its bed during the night. Some excitement ensued on the ground. It was only after looking very carefully with high-powered binoculars that I was able to discern their sausage on its bed. It was the best example of camouflage I have ever seen. Just here it might be said that balloons when exposed to the wind, the rain and the sun, will fade out whatever color they may have. At the time referred to above, my section was using an old French balloon which whatever color it had been to begin with, was at that time almost pure white. The only time it would have been protected naturally would be the middle of winter. A place in a thin wood, or between several rows of trees, other things being equal, will generally make very good protection both from the weather and the enemy.


COURSE OF DESTROYER
Destroyer
Trawler
Destroyer
Trawler
Cruiser
Destroyer leading
Destroyer with Observation Balloon attached
FIVE MERCHANTMEN being CONVOYED and TRAVELLING FORWARD in ECHELON FORMATION
LEFT WING
Trawler
FIVE MERCHANTMEN being CONVOYED and TRAVELLING FORWARD in ECHELON FORMATION
RIGHT WING
Destroyer with Observation Balloon attached
Trawler
Trawler
Destroyer
Trawler
COURSE OF DESTROYER
ZIG ZAG COURSE OF HUNTING DESTROYER
Destroyer

The observation balloon in the navy. These balloons, which ride 3000 feet or more above the surface of the ocean, are sometimes flown from a destroyer though more often they are flown from a regular balloon ship, which has special facilities for handling them. They are used for spotting submarines and are sometimes used in a trans-Atlantic convoy. They are used for coast defence observation and were designed for observation of fire from battleships at very long ranges. Their vulnerability to aeroplane attack was against them though

THE INCREASING OF POWER OUTPUT*

Including Reference to a Six-Stroke Engine

By PROF. EMIL SCHIMANEK

THE power output of an internal combustion engine is evidently improved if the amount of fuel consumed per unit of capacity can be increased, and the more effectively the heat capacity of the fuel is utilized the better will be results.

The quantity of fuel which can be consumed is evidently in direct proportion to the charge of air in the working cylinder, other factors remaining unaffected, and it is therefore possible to increase the power output by increasing the air charge and by improving the thermal efficiency.

To increase power output then, effort in the following directions may be made:

1. To increase thermal efficiency.
2. To increase the number of working strokes per unit of time—
   - *a.* By increasing the revolutions per minute.
   - *b.* By reducing the number of idle strokes; employing the two-stroke cycle instead of the four-stroke.
3. To increase the air charge in the working cylinders, i. *e.*, consuming a greater quantity of air for a given number of strokes.

1. The overall thermal efficiency can only be increased (assuming the mechanical and indicated efficiency to remain unaltered) by increasing the expansion ratio after the combustion of the gases. If we consider similar cycles—*i. e.*, approximately constant volume or constant pressure cycles—in which the volume at the end of expansion is equal to the volume at the beginning of the compression, then the increase in expansion ratio is equivalent to an increase in compression ratio.

Theoretical considerations and practical results have shown that, after a certain limit is reached, the advantage of further increasing the compression ratio is very small. For instance, a constant pressure cycle engine working with a compression of about 38 to 40 atm. could scarcely be improved by increasing the compression. We can scarcely expect a further increase in power output from this direction therefore.

2a. The increase in the number of working strokes per unit of time by increasing the number of revolutions per minute is very effective in augmenting the power output, and is, of course, very general.

2b. Reducing the number of idle strokes has been effected successfully in double-acting engines, also in employment of the two-stroke cycle instead of the four-stroke. With the two-stroke engine, one stroke is required for the expansion, while the remaining stroke may be used either for the exhaust or for the compression. As the compression is essential from a thermal point of view, and as this compression can scarcely be performed elsewhere than in the cylinder itself without entailing considerable losses, it is the usual practice with two-stroke engines to perform the compression during the other stroke. The scavenging and charging of the working cylinder with fresh air is performed during a short portion of the stroke near the dead centre. This requires, besides the working cylinder, a pumping cylinder, taking air in and transferring it to the working cylinder.

During the transfer period the working cylinder is scavenged with the help of the new air charge. Theoretically it would be sufficient to make the cylinder volume of the pump equal to the volume of the working cylinder. As, however, it is impossible to prevent a certain amount of air escaping with the exhaust gases during the scavenging period, and so being lost for combustion, it is the usual practice to make the volume of the pumping cylinder at least 30 per cent larger.

In order to establish a comparison between the four and the two-stroke engines with regard to the necessary cylinder volume per unit of power, we have to add for the two-stroke engine the volume of the pumping cylinder, neglecting for the moment designs employing the crank case as the pump.

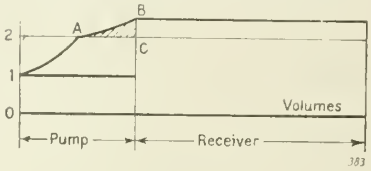


Fig. 1.
Diagram of pump.

Assuming the two-stroke to give twice the power of the four-stroke engine, we obtain for the former, for the same power output, the proportion

$$\frac{\text{Cylinder capacity}}{\text{Power output}} = a = \frac{2.3}{2} = 1.15$$

of that of the four-stroke, *i. e.*, 15 per cent larger. The use of double-acting pumps alters the proportion to

$$a = \frac{1.65}{2} = 0.825.$$

Assuming the two-stroke to give only 1.8 times the power of the four-stroke, the proportion will be

$$a = \frac{1.65}{1.8} = 0.917.$$

The proportions represented by *a*, which will be calculated in all the following comparisons, show the proportion of the total volume of the cylinders of the engines to be discussed to the cylinder volume of the ordinary four-stroke engine for equal power output.

It will be noted that the proportions given in all cases hold good only for the cylinder volume, and should not be considered in relation to the weight of the engine. It is evident that for the same cylinder volume the pumps will be lighter than the working cylinder, including piston and crankshaft, on account of the smaller pressures for the pump.

3. The power increase due to the increase of the air charge in the cylinder of a given volume can be achieved—

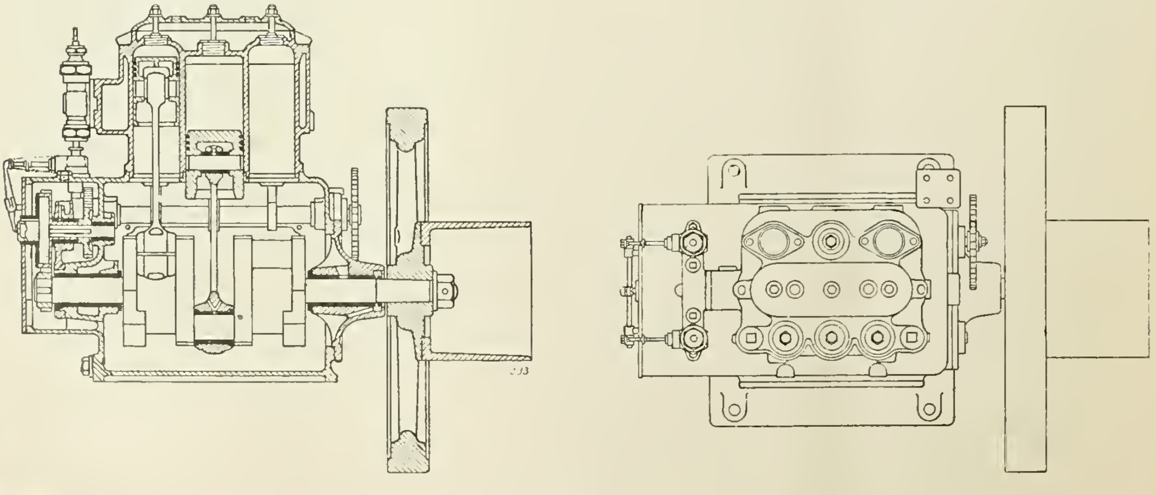
- *a.* By a decrease of the air temperature.
- *b.* By reducing the exhaust residue in the combustion chamber and replacing the corresponding volume by fresh air.
- *c.* By increasing the air pressure before compression.

As examples of *3a* we may mention the difference of power output between air-cooled and water-cooled engines, also the cooling of the air for two-stroke engines during the transfer period from the pump to the working cylinder, as proposed by Prof. Junkers. The power output at this lower temperature is also increased on account of the better thermal efficiency. The increment is due to the fact that the specific heat of the gases increases with the temperature. This increase is evidently the smaller the larger the air charge, which is consequently less contaminated by the remaining exhaust gases.

The power increase which can be obtained by cooling the air before the compression is limited by the temperature of the cooling water. By calculating the necessary cylinder volumes of the working cylinders for the same power output, no account is taken of the various air temperatures, because the proportions vary greatly for various fuels, and mixtures of fuel and air, due to the specific heats. Neglecting this variation in thermal efficiency, and assuming that the specific heats and weights of the air and exhaust residue are the same, we shall need for equal power output an increase of cylinder volume almost proportional to the increase of absolute temperature of the charge.

The method set forth in *3b* has been employed by the Premier Gas Engine Co. for their four-stroke scavenging engines. In these the exhaust residue is expelled from the combustion chamber with compressed air. Also the Hellmann four-stroke engine with complete scavenging may be mentioned.

With the Premier engine the air pump delivers the total air charge, while in the Hellmann engine the pump supplies only the necessary



Figs. 2 and 3.
Four-stroke engine with power increase.

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* Translated from an article published in *Zeitschrift des Vereines Deutscher Ingenieure.*

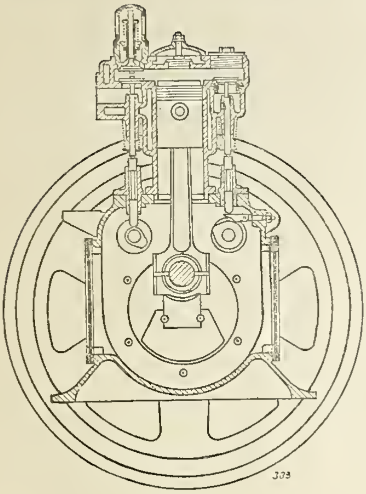


Fig. 4.

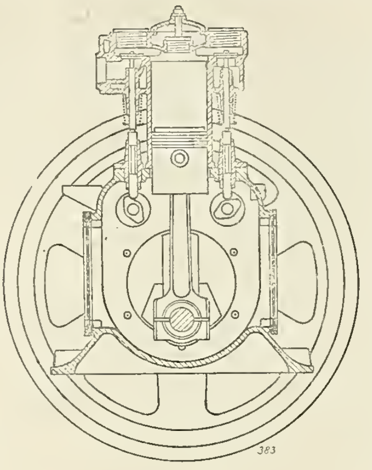


Fig. 5.

quantity of air to scavenge and charge the compression space. The total volume of the working and pumping cylinder is for both machines evidently larger than for the ordinary four-stroke.

To the same group of engines belong also the six-stroke engines, in which two further strokes are added to the normal four strokes, during which the pistons draw in air only, expelling it again through the exhaust valve.

In considering this cycle of operations we must take into account the fact that in the scavenging of the cylinder during the fifth and sixth strokes a cooler charge will result, which increases the thermal efficiency; also the compression space is charged with fresh air, and we can therefore expect a greater economy. Because more fuel has to be consumed during one cycle the thermal efficiency will be adversely affected, and on account of the two additional strokes the mechanical efficiency is not so good.

A calculation could only be made by adopting several assumptions; therefore we will dispense with this, and merely point out that all the methods of operation under 3*b* are only employed with engines having a large compression space. With high-compression engines (Diesel engines) this method is of no practical value.

In method 3*c*—that of charging the working cylinder with air—higher pressure can be effected in the simplest manner with two-stroke engines by increasing the air pumping cylinder. If we assume, as before that the air loss during the scavenging amounts to 30%, and if we make the pumping cylinder 2.3 times as large as the working cylinder, and, furthermore, assume isothermal compression and no throttling losses, we obtain a pressure of 2 atm. in the working cylinder after the transfer. Twice the amount of air is consumed, and we may expect, therefore, twice the power output, other conditions remaining unaltered. Evidently the compression pressure will be twice as high as before. The air pump may either deliver the air in two portions—one portion practically at atmospheric pressure for scavenging and charging the cylinder, and the other portion at higher pressure in order to raise the pressure in the cylinder. In the case of the Junkers engine the exhaust is throttled to such an extent that the lowest pressure in the working cylinder corresponds with the pressure of the charging air. If the exhaust is throttled down to 2 atm. absolute the theoretical power output is doubled.

An example of dividing the air portions into two portions is found in the single-acting two-stroke engine of Sulzer Bros., of Winterthur. In this engine the cylinder is scavenged with an open exhaust, and, after closing the exhaust ports, air at higher pressure is admitted.

With regard to the thermal efficiency and power increase, the method of the Junkers is not so good: First, because the whole amount of air has to be compressed to the high pressure, and, secondly, because some exhaust gases are likely to remain in the cylinder. The position of the inlet and exhaust ports at opposite ends of the cylinder in the Junkers engine has, however, some tendency to diminish the last-named detrimental effect.

The advantage of this two-stroke engine over the four-stroke, with regard to the necessary cylinder volume, is the more marked the higher the charging pressure. If, for instance, we charge with air at 1.5 atm., and assuming isothermal compression, no throttling losses, and double power output as compared with the four-stroke, also double-acting pump, we then arrive at a cylinder volume of working and pumping

cylinder of $1 + \dfrac{1.8}{2} = 1.9$ times as great,

while the power output is three times as great. The proportion of the necessary volume to that of the four-stroke engine for the same output is

$$a = \frac{1.9}{3} = 0.63.$$

If the charging pressure is 2 atm., the proportion works out at

$$a = \frac{1 + \dfrac{2.3}{2}}{4} = 0.504.$$

It is also possible to increase the power output of the four-stroke engine by charging the cylinder with compressed air. The engine takes in its charge from a receiver filled with compressed air, the supply being maintained by means of a pump. The necessary total cylinder volume for a given power output is dependent on the charging pressure, or, in other words, on the desired power increase. With a charging pressure of, say, 2 atm. the power output is double that of the ordinary four-stroke engine. If the pump, which is delivering every alternate stroke, is single-acting, it will require the same volume as the working cylinder, and if double-acting, only half this volume. The volume proportions for the same power output are: In the first case $a = 1$, and in the second case $a = 0.75$. With a charging pressure of 1.5 atm., $a = 1.166$ and 0.913 respectively.

It is also possible, however, to supply by the pump only one portion of the total charge, while the other portion is drawn in by the working cylinder at atmospheric pressure.

The cycle of operation of such an engine is as follows: The piston at the first stroke draws in air from outside. At the end of the suction stroke, after the inlet valve is closed, the cylinder is brought into communication with a receiver containing compressed air supplied by a pump. This air is transferred into the working cylinder and raises the pressure. Then follow the compression, expansion, and exhaust strokes as usual.

If, for instance, the pump supplies the receiver with exactly the same quantity of air as the working cylinder draws in from outside, then we have, after the transfer, *i.e.*, before the compression, a pressure of 2 atm. in the cylinder, assuming isothermal compression in the pump and transfer without losses at the dead centre. The power output will be twice as large as for the ordinary four-stroke. The total volume of working and pumping cylinder, with a single-acting pump, will be $1 + 0.5 = 1.5$, and

the proportion $a = \dfrac{1.5}{2} = 0.75$, on account of

the double power output. With a double-acting pump we have

$$a = \frac{1 + 0.25}{2} = 0.62.$$

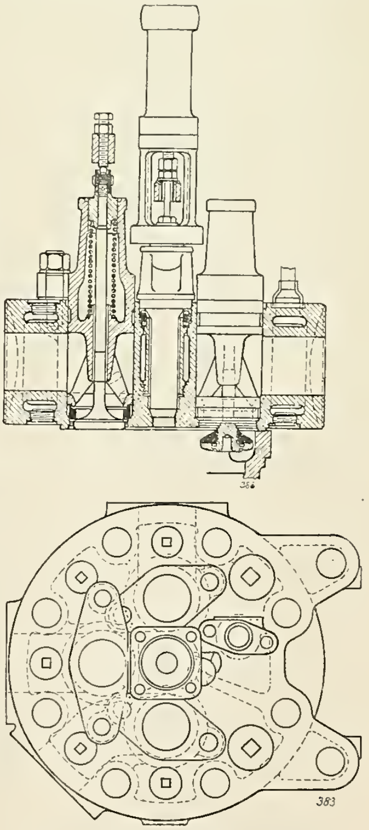
Evidently this proportion is more favorable than that for the two-stroke engine without power increase, as the pump has also to supply the extra amount of air lost during the scavenging period. The advantages over the two-stroke are, therefore, no loss of air and a better exhaust. The disadvantage is the higher pressures in the working cylinder. In the above example the pressures are twice as high as in the two-stroke without power increase,

The thermal efficiency of this engine is not so good as that of the ordinary four-stroke. This will be the more pronounced the smaller the receiver is for the compressed air. This is due to the fact that the air has to be transferred from the receiver at higher pressure in the cylinder at lower pressure, neglecting even the losses on account of the acceleration and throttling of the air.

This loss can be approximately illustrated in the pump diagram (for isothermal compression). The area ABC (fig. 1) illustrates the loss, which evidently increases with the receiver pressure. With an indicated mean effective pressure of 10 atm., and a receiver volume equal to twice the volume of the pumping cylinder, this loss amounts to 1.15% of the indicated power of the working cylinder.

Figs. 2 to 5 illustrate an engine working on the above principle. The central cylinder is the pumping cylinder, while the two outer cylinders are the working cylinders. The valves are disposed on both sides of the cylinder. The transfer valve is in connection with a ring space by means of several holes, whereby the fuel is atomised as the air under pressure is admitted. The pistons of the fuel pumps are operated upwards by a cam on the camshafts, while a spring controls the return stroke. A centrifugal governor (not shown) is mounted in the gear, which governs the stroke of the fuel pump's pistons by interposing a wedge. The experiments with this engine were not completed at the time these notes were prepared, but the preliminary tests confirmed the theoretical conclusions regarding the power output.

It is also possible to increase the power output without the addition of a special air pump



Figs. 7 and 8.
New cylinder head by Schimanek, with transfer valve removed.

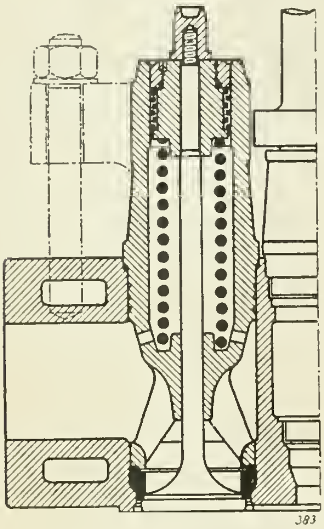


Fig. 9.
Transfer valve with balancing piston.

by employing more than four strokes, namely, by arranging several suction strokes before each compression and expansion stroke. The air taken in before the last suction stroke is pumped into a receiver and stored there until at the end of the last suction stroke—*i.e.*, before the compression stroke—it is transferred back into the cylinder to supplement the charge. The total charge is therefore accumulated during the successive suction strokes. The six-stroke engine (see fig. 6) may serve as an example. The six strokes are—

First stroke: Suction of air from outside (line A—B).

Second stroke: Compressing the air into the receiver (line B—C).

Third stroke: Suction of air from outside (line C—D).

Between the third and fourth stroke: Transfer of the air from the receiver into the cylinder, increasing the pressure to about 2 atm. (line D—E).

Fourth stroke: Compression of the charge (line E—F).

Fifth stroke: Combustion and expansion (line F—G).

Sixth stroke: Exhaust (line G—H).

By this cycle of operations we consume during six strokes twice as much air as during the four strokes of the four-stroke engine. For the same number of revolutions, therefore, the power output of the six-stroke is $\frac{2 \times 4}{6} = 1.33$ times that of the four-stroke. For the same cylinder capacity we obtain, therefore (without transfer losses), almost 33% more power.

In Table I. are tabulated the necessary total volumes of working and pumping cylinders for the theoretical power output of the previously discussed cycle of operation.

An eight-stroke engine would have the following cycle of operations:

First stroke: Suction of air from outside.

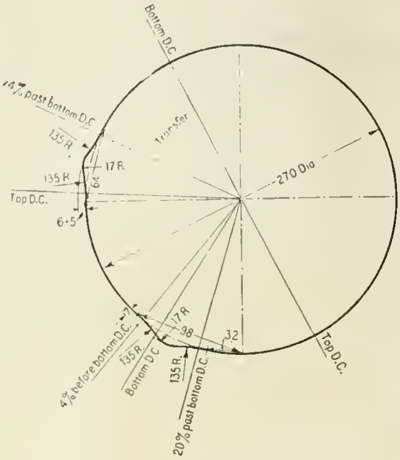


Fig. 10.
Cam for transfer valve.

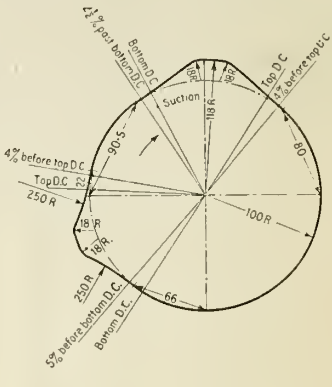


Fig. 11.
Cam for suction valve.

Second stroke: Compression of the air into a receiver.
Third stroke: Suction of air from outside.
Fourth stroke: Compression into the receiver.
Fifth stroke: Suction of air from outside.

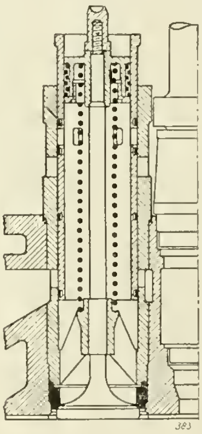


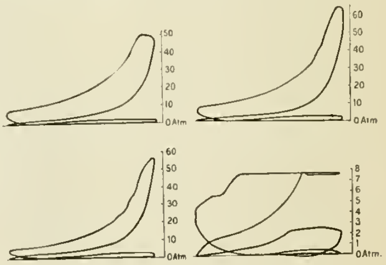
Fig. 12.
Combined suction and transfer valve with sleeve valve distributer.

Between the fifth and sixth stroke the air stored in the receiver is transferred back into the cylinder, in which the pressure will rise to about 3 atm. absolute; then follows the
Sixth stroke: Compression.
Seventh stroke: Combustion and expansion.
Eighth stroke: Exhaust.

The power output would be about 50% larger than that of the four-stroke.

In practice the six-stroke engine offers considerable promise. First of all, it is advisable to study the probable influences which may effect the 33% increase in power output as previously estimated.

It was assumed that during one cycle the six-stroke consumes twice as much air as the four-stroke on account of the two suction strokes preceding the combustion. In fact, there exist only during the first suction strokes the same conditions as in the case of the four-stroke. At the beginning of the second suction stroke, the combustion chamber of the cylinder is filled with air at receiver pressure, and the volumetric efficiency is influenced by the expansion of this air to atmospheric pressure. During the second and the following (with eight or more strokes) suction strokes the volumetric efficiency is only then high if the combustion chamber is not too large. The use of this principle is therefore restricted to such engines as have a high compression—*i.e.*, constant pressure cycle engines. If the volume of the receiver is four times that



Figs. 15, 16, 17, and 18

Compression of 45.3 atm. Compression of 54.5 atm. Output 46.2 h.p. Rev. per min. 207. Compression of 54.5 atm. Weak spring diagram.

TABLE I.

Cycle of Operations.			Cylinder Volumes. Working Cylinder.	Pumping Cylinder. Single Acting. (*a.*)	Pumping Cylinder. Double Acting. (*b.*)	Both Cylinders. (*a.*)	Both Cylinders. (*b.*)	Theoretical Output.	Proportions of the Total Cylinder Volumes for Equal Theoretical Output. (*a.*)	(*b.*)
Four-stroke	Ordinary		1	0	0	1	1	1	1	1
	The total amount of air is supplied by the pump	Charge at 1.5 atm.	1	0.75	0.375	1.75	1.375	1.15	1.16	0.913
		" " 2 "	1	1	0.5	2	1.50	2	1	0.75
	The extra amount of air is supplied by the pump	" " 1.5 "	1	0.25	0.125	1.25	1.125	1.5	0.835	0.75
		" " 2 "	1	0.5	0.25	1.5	1.25	2	0.75	0.625
Two-stroke	Ordinary		1	1.3	0.65	2.3	1.65	2	1.15	0.825
	Power increase of 50%		1	1.8	0.9	2.8	1.9	3	0.93	0.63
	" 100%		1	2.3	1.15	3.3	2.15	4	0.825	0.504
Six-stroke			1	0	0	1	1	1.33	0.75	0.75

of the working cylinder, and if the compression space is 8% of the cubic capacity of the cylinder, we shall have about 92% of the cylinder volume filled with fresh air at the end of the second suction stroke. During the first suction we shall also have a little loss on account of the exhaust residue expanding first. This loss of air charge is insignificant with the six and four-stroke and can be neglected. The charge of the six-stroke will therefore not be double that of the four-stroke, but only 1.92 times as great. With the same compression space, the pressures during the compression and expansion will be 1.92 times as great as those of the four-sroke. As mentioned before, this increase in pressures exists with all the cycles working with an increased air charge. However, with the six-stroke these pressures occur only during each sixth stroke.

Professor Junkers, in his article in *Der Oelmotor,* gives some valuable information on the admissible pressure increase. The article shows clearly the possibility of working with high pressures without any practical disadvantages.

With the six-stroke, however, we have to consider the following: As a rule the necessary dimensioning of an engine is governed by the highest pressures on account of the material stresses. With constant pressure cycle engines using compressed air for starting, this pressure is not the compression pressure before the combustion, but the pressuse resulting at the first combustion in the cylinder when starting. Normally this pressure is not higher than 60 atm. With the six-stroke any desired compression can be obtained during the starting period. Before the starting operation the receiver is at atmospheric pressure, and during the starting this pressure increases according to the quantity of air stored gradually, until after several revolutions equilibrium exists between the pressures, depending on the size of the receiver. However, by opening a cock in the receiver any desired pressure may be maintained in the receiver during the starting period. This controls the pressure at the beginning and the end of the compression stroke, which can be regulated as desired, and there need be no higher pressures during the starting period, therefore, than is the case with the four-stroke.

The ignition of the fuel can be assumed to be just as certain as with the four-stroke, because during the starting period only a negligible quantity of heat is carried away through the receiver wall on account of the relatively low temperature of the stored air and the small heat conductivity of the latter, also the temperature loss is made good again through the increase in temperature due to the throttling effect during the transfer. The maximum temperatures of the compression cannot therefore materially differ from those of the four-stroke with the same pressures.

The maximum pressures can be limited to 60 atm., and the sizes and strength of parts can be left the same as for the four-stroke.

If in spite of this we have to limit the compression pressure to 50 atm. in the six-stroke, we have to increase the compression space accordingly, thus somewhat reducing the thermal efficiency and also the power output. If we operate the four-stroke with a compression pressure of 35 atm. and the six-stroke with only 50 atm., then the proportion of thermal efficiencies of constant pressure cycles at the highest outputs is in the proportion of about 109 to 100, considering the variation of the specific heat.

The effective power output is influenced not only by the thermal efficiency of the cycle, but also by the heat losses to the cooling water and mechanical efficiency, and we may now discuss what effect the six-stroke cycle has on these.

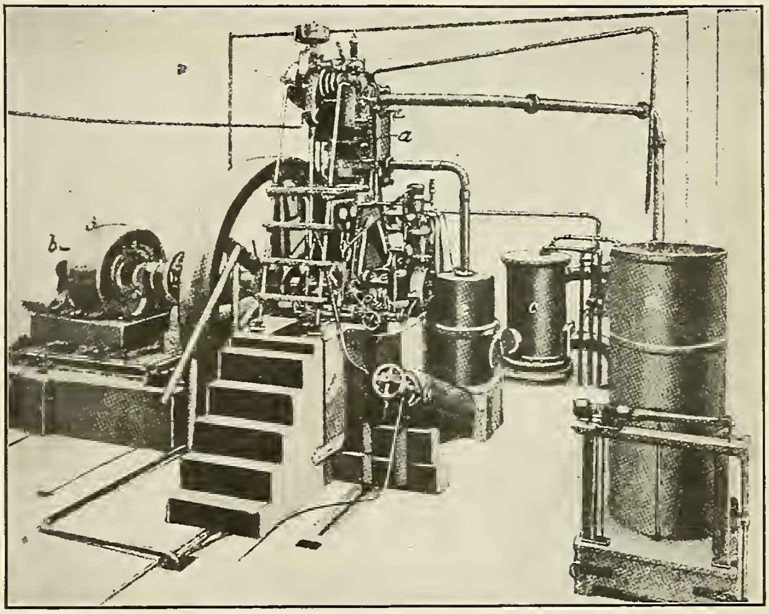
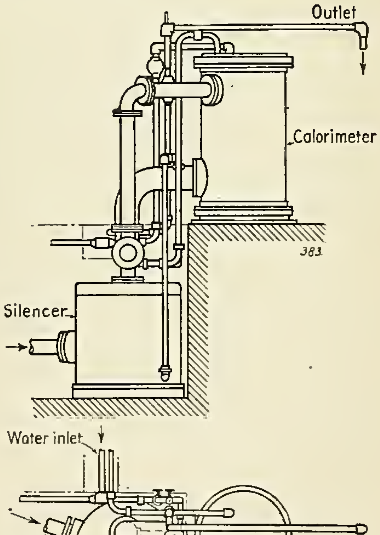


Fig. 13.—See description of Fig. 14

It is known with the four-stroke that the water cooling has no effect on the heat utilisation for the power output during the suction and exhaust strokes, and only a small effect during the compression stroke. Only during the combustion and expansion has the heat loss of the charge a detrimental effect on the heat utilisation. For the six-stroke engine there are five strokes during which the cooling water has little or no detrimental effect. If, therefore, the temperatures during the combustion and expansion do not materially exceed those of the four-stroke, which can easily be assured by cooling the receiver, then the heat loss to the cooling water for the same number of revolutions for the six-stroke is smaller than for the four-stroke. The resulting gain in power can only be estimated. Using the method of E. Meyer, this gain works out, roughly, from 4% to 5% of the indicated power; 4% has been adopted for the further calculations.

The mechanical efficiency of the six-stroke engine is bound to be better than that of the four-stroke engine. The friction losses are only dependent on the pressure—*i.e.,* on the load. The greater power output of the six-stroke therefore assures a better mechanical efficiency. Based on results from Diesel engines, this gain may be estimated at 5% to 6% of indicated power. It is assumed, however, that this gain is counterbalanced by the losses of transfer of air into the receiver and back into the cylinder.

The effective power output of the six-stroke is therefore, for the same dimensions and same compression space,



Figs. 19 and 20.
Water-cooled silencer with calorimeter.

$$1.33 \times \frac{1.92}{2} \times 1.04 = 1.33$$

that of the four-stroke. Limiting, however, the compression pressure to 50 atm., the power output on account of the above mentioned influences is

$$\frac{1.33}{1.09} = 1.22$$

that of the four-stroke engine.

In order to determine the power output and heat balance of the six-stroke engine, Ganz and Co., of Budapest, have fitted a four-stroke Diesel

(*Continued on page* 193)

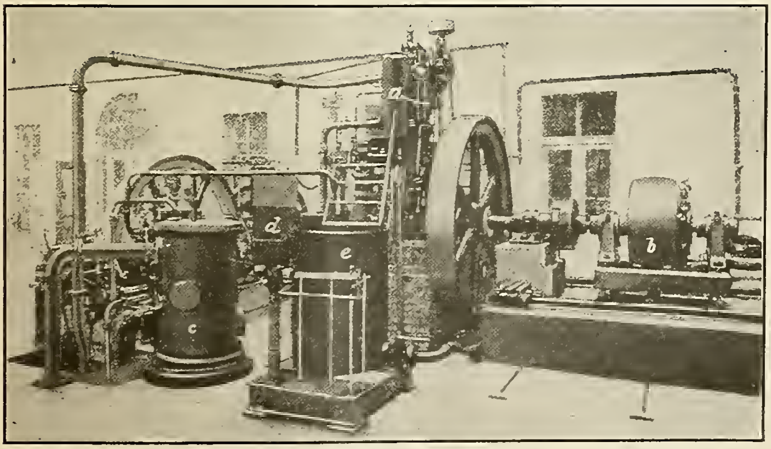


Fig. 14.—(a) Engine. (b) Dynamo. (c) Calorimeter for exhaust gases. (d) Tank for measuring the cylinder cooling water. (e) Tank for measuring the cooling water of the exhaust gas calorimeter

THIRD ANNUAL REPORT OF THE NATIONAL ADVISORY COMMITTEE ON AERONAUTICS

(Continued from page 139)

Meteorology and Aeronautics

IN the field of meteorology, the committee recommended to the President an appropriation for the extension of the aerological work of the United States Weather Bureau, and in accordance with which an appropriation of $100,000 was made by Congress for this work, with special reference to the securing of more comprehensive observations on the air in aid of aviation. The committee also acted in cooperation with the United States Weather Bureau in placing meteorological exhibits at the First Pan American Aeronautic Exposition.

In August, 1917, the Advisory Committee recommended that there be organized under the Chief Signal Officer of the Army, as a war measure, a military aerological service with necessary stations and equipment, both in the United States and abroad, and that this service be organized in full cooperation with the Weather Bureau and with care to avoid duplication.

A special report on meteorology and aeronautics has also been prepared and issued as Technical Report No. 13.

Board of War Inventions in Aeronautics

Soon after the declaration of hostilities with Germany the Chief Signal Officer of the Army called to the attention of the committee the large amount of material which was coming before the War Department, comprising inventions and suggestions relating to aeronautics in warfare, and asked assistance in examining and disposing of such material. Accordingly, this committee, through an appropriate subcommittee appointed for the purpose, has acted as a board of inventions for the Government in matters relating to aeronautics, and since the outbreak of hostilities between the United States and Germany it has weekly examined hundreds of suggestions and inventions pertaining to this subject and referred to it by the War and Navy Departments, in addition to the suggestions and inventions which come direct to the committee. This work has required a large amount of time and careful study and has called for considerable increase in the technical and clerical staffs of the committee in order to care for the very large amount of examinations, study, and correspondence with inventors regarding these matters. Several suggestions of value have been received and brought promptly to the attention of the particular Government office most directly interested.

Definition of Technical Terms

During the year the committee has given further attention to the subject of the definition and standardization of technical terms used in aeronautics, and has prepared a further edition of its bulletin on the subject of nomenclature (Technical Report No. 15).

Metric System for Drawings and Calculations

On recommendation of the Advisory Committee, in December, 1916, the War, Treasury, Interior, and Commerce Departments adopted the metric system of weights and measures for all drawings and calculations on aeronautical matters, for use with the accompanying English equivalents. Due to the exigencies of war activities, however, the metric system has not been used generally by the War Department.

Aerial Mail Routes

In December, 1916, the subject of cooperation with the Post Office Department in the establishment of aerial mail routes was considered, and the same matter in one form or another has been considered from time to time since that date. Recently the Second Assistant Postmaster General has expressed a desire to develop such routes in a trial way and so far as military requirements may permit furnishing the needed equipment and personnel. The committee is prepared to advise with and aid the Post Office Department in the furtherance of these aims.

Civil Aerial Transport

In the latter part of 1917 the general subject of civil aerial transport was brought to the attention of the committee and a special subcommittee was appointed to take under consideration the various phases of civil and commercial uses of aeronautics, with special reference to the conditions which may be expected to develop at the close of the war.

Landing Field for Transient Aviators

In connection with the accommodation of transient aviators in Washington, the committee cooperated with the War Department in the selection of a tract of land on the Eastern Branch of the Potomac River and southeast of the Washington Navy Yard.

Productive Capacity of Aeronautic Industry—Inspection Trips

During November, 1917, members of the Advisory Committee in two different groups made trips of inspection to the three principal centers of aeroplane production, namely, Dayton, Ohio; Detroit, Mich.; and Buffalo, N. Y.

The purpose of these trips was to place the committee in immediate contact with the conditions in the industrial field and give them an opportunity of forming a personal, first hand judgment regarding the productive capacity for aeroplanes and for aeronautic engines as provided by the facilities developed at that date, and as contemplated in plans for further development.

The members of the committee have been very favorably impressed with the serious energy and purpose with which the manufacturers are approaching the problem of the quantity production of aircraft and aircraft engines, and with the productive capacity which is now rapidly approaching the point of effective service. Counting on a similar spirit and purpose throughout the field of aircraft industry, there seems every reason to anticipate productive capacity adequate to meet the needs of the Government.

Technical Reports

The first annual report of the committee contained technical reports Nos. 1 to 7, and the second annual report Nos. 8 to 12. With this, the third annual report, the committee submits technical reports Nos. 13 to 23, as follows:

Report No. 13. entitled "Meteorology and Aeronautics" was prepared by Prof. William R. Blair, in charge of aerological investigations, United States Weather Bureau, and submitted through the subcommittee on the relation of the atmosphere to aeronautics. This report discusses problems and general phenomena of the atmosphere. On request of the Signal Corps, it has been printed as a separate document by the committee for widespread distribution, as it contains information of special value to all aviators and aeronauts.

Report No. 14, entitled "Experimental Research on Air Propellers," was prepared and submitted by Dr. William F. Durand, chairman of the National Advisory Committee for Aeronautics. A brief description of this report is contained under "General problems and activities," paragraph E. It has been printed by the committee as a separate document for immediate distribution in order to supply much-needed information at the earliest moment to those who are interested in the design of air propellers.

Report No. 15, entitled "Nomenclature for Aeronautics," was prepared and submitted by the subcommittee on nomenclature for aeronautics, of which Dr. Joseph S. Ames is chairman. It has been printed by the committee as a separate pamphlet.

Report No. 16, entitled "The Stretching of the Fabric and Deformation of the Hull in Full Balloons," is a translation from the German, by Prof. Karl K. Darrow, of the University of Chicago.

Report No. 17, entitled "An Investigation of the Elements which Contribute to Statical and Dynamical Stability and of the Effect of Variation in those Elements," was prepared by Prof. Alexander Klemin, of the Massachusetts Institute of Technology, under contract entered into by the committee with Prof. C. H. Peabody, of the same institution.

Report No. 18, entitled "Aerofoils and Aerofoil Structural Combinations," is a graduating thesis prepared at the Massachusetts Institute of Technology by Maj. H. S. Martin, S. C., and Maj. E. S. Gorrell, S. C., and has been included in the present report by the committee on account of the importance of the information which it contains.

Report No. 19, entitled "Periodic Stresses in Gyroscopic Bodies with Application to Air Screws," was prepared and submitted by Dr. A. F. Zahm of the Washington Navy Yard.

Report No. 20, entitled "Aerodynamic Coefficients and Transformation Tables," was prepared by the committee under direction of Dr. Joseph S. Adams, member.

Report No. 21, entitled "Theory of an Airplane Encountering Gusts, II," was presented as a paper before the American Philosophical Society by Prof. E. B. Wilson, of the Massachusetts Institute of Technology, being a continuation of a report on the same subject printed in the first annual report of the committee. For this reason and in order to complete the treatment of the subject in the records of the committee this paper is included in the present report.

Report No. 22, entitled "Fabrics for Aeronautic Construction," was prepared by Mr. E. D. Walen, of the United States Bureau of Standards, and submitted through the subcommittee on standardization and investigation of materials. This report consists of two parts, the first dealing with cotton fabrics intended for the covering of aeroplane wings and the second with balloon fabrics.

Report No. 23, entitled "Aeronautic Power-Plant Investigations," was prepared by Dr. H. C. Dickinson, of the United States Bureau of Standards, and submitted through the subcommittee on power plants. This report consists of three parts. The first, entitled "Performance of Aeronautic Engines at High Altitudes," gives a description of the construction and equipment of a special testing laboratory intended to furnish, under control, the operating conditions of an aeronautic engine at high altitudes and under any desired conditions of air density, temperature, and humidity. Part 2, entitled "Radiator Design," gives a description of special apparatus designed and constructed for the investigation of different types of radiator sections and with a view to the development of the better knowledge of the interrelation among the various factors entering into radiator performance. Part

The French "Corps d'Armée" Letard biplane equipped with two Hispano-Suiza motors

3, entitled "Spark Plugs," gives a description of a series of tests on different types and forms of spark plugs and of measurements intended to indicate the relation between the various factors affecting performance of the same.

General Problems and Activities

The general problems enumerated in the preceding annual reports of the committee constituted the program of work during the past year. Progress has been made in the scientific study and solution of these problems which are considered of immediate importance, and they will be attacked on a larger scale by the committee with the increased facilities which will be available on completion of the committee's research laboratory at Langley Field.

A. *Stability as determined by mathematical investigations.*—The literature on this subject has been augmented by a report (No. 21) entitled "Theory of an Airplane Encountering Gusts, II," prepared by Prof. E. B. Wilson, of the Massachusetts Institute of Technology, in continuation of his report on the same subject contained in the first annual report of this committee.

Report No. 17, entitled "An Investigation of the Elements which Contribute to Statical and Dynamical Stability and of the Effects of Variation in Those Elements," contains valuable information from the standpoint of inherent stability, and also gives data on static longitudinal balance heretofore unavailable to the designing engineer.

B. *Air-speed meters.*—The complete air-speed meter involves an indicating instrument and a head for the production of pressure difference, which may be either a Pitot or Venturi tube or a combination of the two. The French use almost entirely the Venturi-Pitot; the English, the Pitot with accompanying static tube. With a view to diminishing the danger of clogging the tube with water, Dr. A. F. Zahm, of the Washington Navy Yard, has inverted the mount on the Venturi-Pitot combination so that draining is more certain, and also used a larger cross-section of throat and connecting tubes than has been common abroad. This tube gives a difference of pressure almost exactly proportional to the square of the speed, and though considerably heavier than the English Pitot tube, it permits of the use of a more rugged indicating instrument. The recently improved Foxboro indicating instrument is considerably reduced in size and behaves very well under the trying conditions of vibration experienced on an aeroplane, but the scale is very far from uniform. The production of a uniform scale is the next improvement to be desired, and development is being pushed with several types. Maj. C. E. Mendenhall, a member of the subcommittee on instruments, has in hand a large number of problems.

C. *Wing sections.*—Several aerofoil sections designed by officers of the Signal Corps and tested in the Massachusetts Institute of Technology wind tunnel give promising results. A description of these aerofoils and the data obtained from the tests are embodied in Report No. 18.

D. *Engines.*—The most notable development in aeronautic engines in America during the past year has been the Liberty engine, designed under the direction of the Aircraft Production Board and embodying the best American ideas in combination with information from Europe regarding the best foreign designs, and made available during the early summer of 1917.

D-1. The manufacture of the Hispano-Suiza engine has been successfully developed in the United States during the past year, and certain other engines of foreign design have been likewise modified with reference to economical quantity production by American manufacturers.

D-2. An experimental study of the fundamental principles of radiator design, with particular reference to the effect of air velocity and density on the cooling capacity of various possible types of cellular construction, was undertaken in May, 1917. For the purposes of this investigation, a comprehensible experimental plant has been constructed at the Bureau of Standards and specimen radiators have been obtained from most of the manufacturers of automobile as well as aeronautic radiators. This group of specimens includes not only a wide variety of types of construction, but several series of specimens differing in one respect only, as for instance, cell length. Measurements are being made for this group of specimens of the cooling capacity, head resistance, weight, water capacity, resistance to water flow, air cell dimensions, etc.

D-3. During the present year suitable testing equipment has been installed at the Bureau of Standards for the carrying on of an extended experimental program on aircraft engine performance with special reference to high altitude conditions. The "altitude" laboratory planned for these investigations comprises the following equipment:

A reinforced concrete chamber, in which engines may be run at reduced pressures of below one-half atmosphere; a 300 horsepower dynamometer for absorbing and measuring the power output; an enhaust blower of sufficient capacity to carry off the exhaust from the engines under test and to maintain the reduced pressure in the test chamber; a refrigeration plant for cooling the intake air and the air circulation in the chamber; fans for producing circulation in the test chamber; and equipment for measuring all quantities necessary for a complete record of engine performance.

One of the Liberty engines (eight cylinder) now in place in the test chamber is being studied for the effects of altitude and fuel changes. Following this it is expected that the twelve cylinder model will be studied, then other engines, particularly those especially designed for high altitude flying, will be taken up.

D-4. The study of performance and causes of failure of spark plugs has developed a large number of parallel investigations. The causes of failure are numerous, including mechanical (accidental) breakage, cracking due to thermal expansion, gas leakage under compression, fouling with soot, or carbon deposit, and "cut-out" or short circuiting as the insulator becomes conducting at high temperatures.

The latter, while perhaps not the most common cause of failure, offered the most promise of valuable results from a laboratory investigation, hence the greater share of time has been devoted to it. Satisfactory laboratory methods have been developed for measuring and specifying the relative merits of different types of spark plugs as regards "cut-out."

Reasonably satisfactory methods for testing for gas leakage and liability to breakage from sudden heating have been developed.

Specifications for acceptance tests of spark plugs have been prepared in cooperation with the inspection section of the Signal Corps, and tests under these specifications have been carried on at the Bureau of Standards, where the spark-plug investigation is in progress. These tests include not only laboratory tests, but endurance tests in an engine.

D-5. A method of measuring vapor pressures of gasolines has been developed and the necessary equipment nearly completed. This work is now being carried on at the University of Virginia by a member of the faculty who spent the summer at the Bureau of Standards perfecting the program and building the experimental apparatus.

Work on the latent heats of fuels has only recently been undertaken at the Harvard laboratory, where space and shop facilities are available. Trial apparatus for this work is under construction, but the final design of experimental esuipment has not yet been perfected.

E. *Propellers.*—During the year an investigation has been carried out on model propellers, the results of which are given in Report No. 14. A series of model propellers selected for this investigation have been taken with a view of regular distribution among the various properties and characteristics, such as pitch, form of blade, blade width, form of blade section, etc. These tests are intended to form a basis for comparison with experiments carried on in other laboratories, and also with the system of theoretical design now in common use and first enunciated by Drzewiecki. They are also intended to serve as a basis of comparison with coefficients of the performance of full-scale propellers in order to provide much-needed information regarding the relation between model and full-scale experiments. It is a part of the program held in view to test a certain number of full-sized propellers representing a distributed selection of the model forms. The results of such tests will then serve to connect directly the model tests on the corresponding forms with full-sized tests, and, presumably, by extension the coefficients thus developed may be used for the entire series of model experiments.

A further contract has been made with Dr. W. F. Durand, to be carried out at the aerodynamic laboratory at the Leland Stanford, Jr., University, covering a large number of further investigations in the field of air-propeller performance.

F. *Form of aeroplane.*—During the year there has been carried on at the Massachusetts Institute of Technology on behalf of the committee an investigation on this subject by Prof. Alexander Kelmin, the results of which are published in Report No. 17.

A large amount of experience with full-sized machines in Europe, especially under war conditions, has contributed greatly to a better understanding of this important problem, and in particular much available information has been acquired regarding the factors involved in inherent stability.

G. *Radiotelegraphy.*—During the year the committee has carried on active work on the subject of radiotelegraphy in cooperation with various other agencies engaged in the study of this problem. The best form of generator for use on airplanes has been given careful study, and it has been developed (*a*) that 500 cycle alternating current generators, giving 1,000 sparks per second, and of an output of 500 watts can be and have been made, which will satisfy all the requirements of the Army and Navy which were imposed; (*b*) a vacuum tube oscillator for telephonic communications between aeroplanes has been developed, giving satisfactory results.

The porblem of receiving wireless signals has also been investigated and it has been established that a very efficient receiving set employing the sound method is practicable. The question of detecting and locating hostile aeroplanes or airships before they are seen, or heard by the unaided ear, has also been investigated, but without thus far fully satisfactory results.

H. *Bibliography of aeronautics.*—A bibliography of aeronautics was published by the Smithsonian Institution in 1909. The committee has well in hand the extension of this work up to January, 1917, and it will be published as soon as completed.

(To be continued.)

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77 Planes Soar in Mineola Group

The greatest spectacle Mineola's aviation fields has ever witnessed was a formal inspection on the morning of September 27 by Major Gen. William L. Kenly, Director of Military Aeronautics, of "Group A" of the Reserve Wing.

Seventy-seven planes lined up in a row more than a quarter of a mile long, each pilot at attention, Gen. Kenly, in a blue De Haviland, driven by Col. C. K. Rhinehart, the Wing Commander, "taxied" up and down the long line on the ground and looked them over. There were four squadrons of eighteen machines each, and a few extra ones. Each squadron's machines were painted a distinctive color.

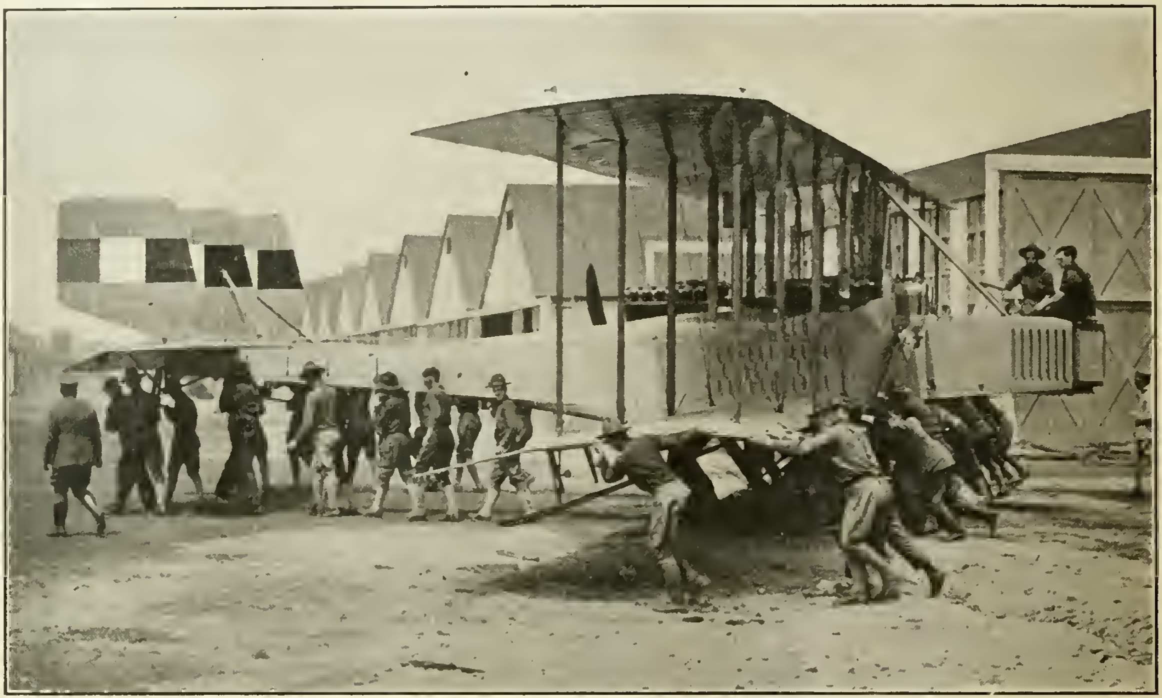
As he reached the end of the lines Gen. Kenly's machine took him aloft about 2,000 feet. Meanwhile all seventy-seven propellers were started whirling. Then, one after the other, the long line of "ships" took to the air. Each plane sought out its squadron mates of the same color, and then the whole fleet broke up into fighting formations of five planes to the unit, flying in V-shapes. They remained aloft about twenty minutes and then the show ended.

Travel by Aeroplane

London.—Six members of the party of American editors, who are visiting English war plants and the battle fronts as guests of the British Government, flew from England to France on September 26. They were Dr. Wheeler, of *Current Opinion;* Fred W. Kellogg, of the San Francisco *Call;* S. J. Duncan Clarke, of the Chicago *Post!* Ellery Sedgwick, of the *Atlantic Monthly;* Dr. Vanhise, president of Wisconsin University, and Charles Towne, of *McClure's Magazine.* The remainder of the party made the trip by boat.

Two Aero bombing type biplanes. (Official photo)

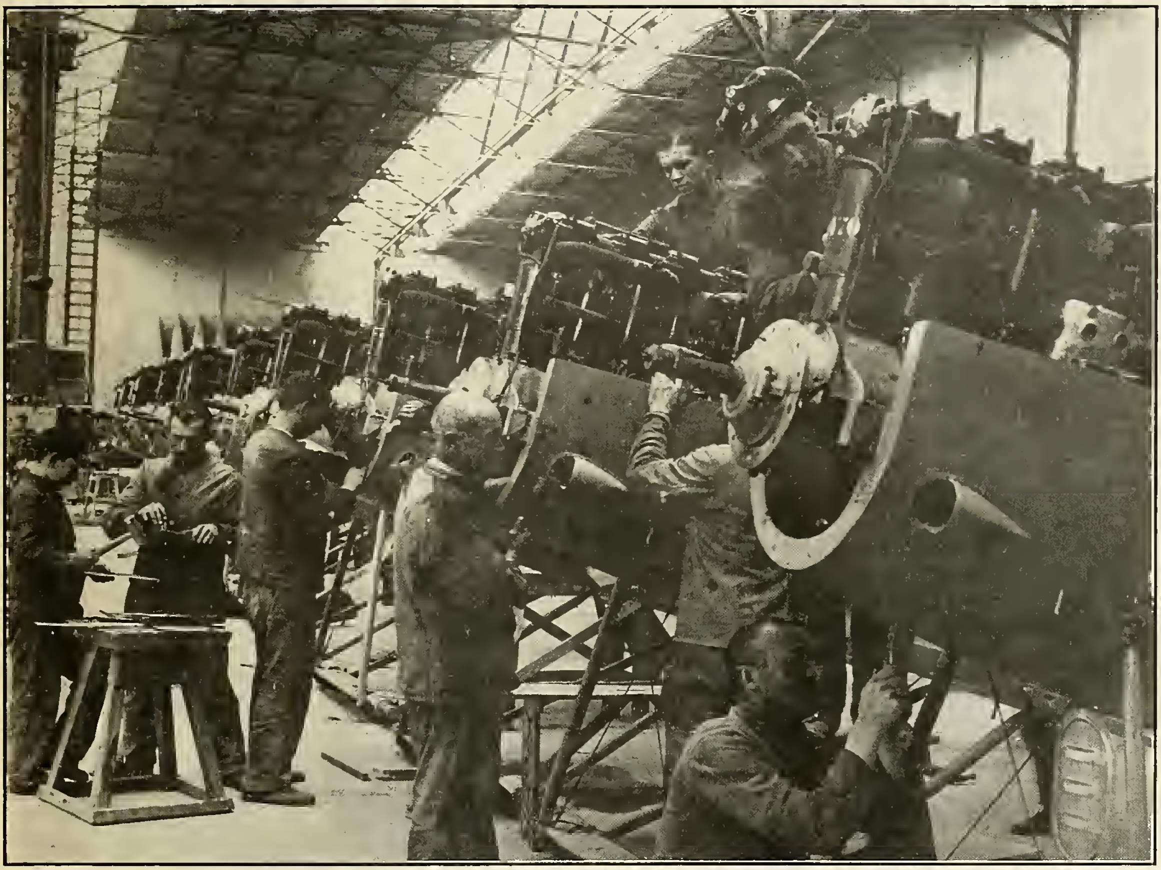
AEROPLANES OF THREE A



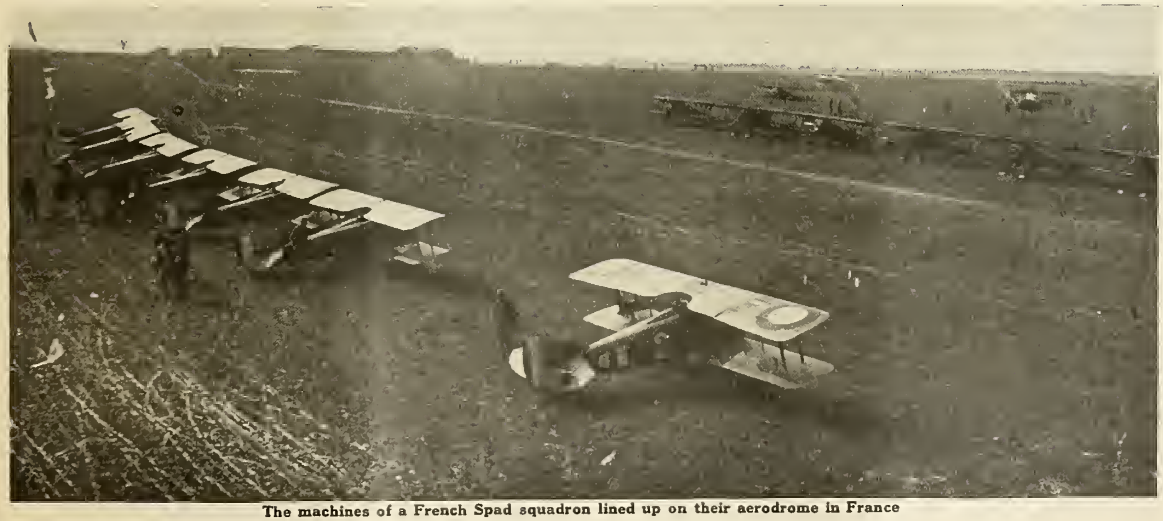
An American-made Caproni bombing biplane equipped with three Liberty motors

A squadron of the British Royal Air Force, with their machines, in France

NATIONS AND—GERMANY

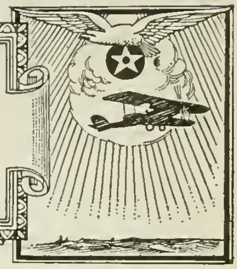


In the interior of a German aircraft factory, showing the introduction of the motors into the fuselage. The photograph is one obtained from the British official sources



The machines of a French Spad squadron lined up on their aerodrome in France

NAVAL and MILITARY AERONAUTICS



Key to Abbreviations

AAD—Assigned to active duty.
ABC—Report to Army Balloon School, Arcadia, Cal.
ADO—Report to Aviation Supply Depot, Dayton, Ohio.
ADT—Report to Aviation Supply Depot, Dallas, Texas.
AFO—Report to Aviation Supply Depot, Fairfield, O.
AGC—Report to Aviation Supply Depot, Garden City, L. I., N. Y.
AHT—Report to Aerial Gunnery School, Houston, Texas.
AIR—Transferred to the Air Service, National Army, without change in rank or date of commission.
ALF—Report to Camp Alfred Vail, Little Silver, N. J.
AMV—Report to Aviation General Supply Depot, Morrison, Va.
AOV—Report to School for Aerial Observers, Hampton, Va.
APR—Report to School of Aerial Photography, Rochester, N. Y.
ARV—Report to Aviation Supply Depot, Richmond, Va.
ASM—Report to Aviation Mechanics' Training School, St. Paul; Minn.
BFT—Report to Barron Field, Fort Worth, Texas.
BRN—Report to Bakers Field, Rochester, N. Y.
BST—Report to Brooks Field, San Antonio, Tex.
CAF—Report to Carlstrom Field, Arcadia, Fla.
CAP—Commissioned as Captain, Aviation Section, Signal Corps.
CDT—Report to Aviation Concentration Camp, Dallas, Texas.
CFT—Report to Carruthers Field, Fort Worth, Texas.
CGC—Report to Aviation Concentration Camp, Garden City, L. I., N. Y.
CGS—Report to Aviation Concentration Camp, Greenville, S. C.
CIT—Report to Radio School, Carnegie Institute of Technology, Pittsburgh, Pa.
CJS—Report to Camp Jackson, Columbia, S. C.
CJW—Report to Camp John Wise, San Antonio, Texas.
CLR—Commissioned as Colonel, Aviation Section, Signal Reserve Corps.
CMV—Report to Aviation Concentration Camp, Morrison, Va.
CPA—Commissioned as Captain Air Service, National Army.
CPR—Commissioned as Captain, Aviation Section, Signal Reserve Corps.
CRI—Report to Chanute Field, Rantoul, Ill.
CSO—Report to the Chief Signal Officer, Washington, D. C.
CUI—Report to School of Military Aeronautics, Cornell University, Ithaca, N. Y.
CWT—Report to Call Field, Wichita Falls, Texas
DAF—Report to Dorr Field, Arcadia, Fla.
DAP—Report to Director of Aircraft Production, Washington, D. C.
DIK—Report to Camp Dick, Dallas, Tex.
DIS—Honorably discharged from service.
DMA—Report to Director of Military Aeronautics, Washington, D. C.
ELA—Report to Eberts Field, Loanoke, Ark.
EOT—Report to Ellington Field, Olcott, Texas.
FLA—Commissioned as First Lieutenant Air Service, National Army.
FLR—Commissioned as First Lieutenant, Aviation Section, Signal Reserve Corps.
FLT—Commissioned as First Lieutenant, Aviation Section, Signal Corps.
FOB—Report to Fort Omaha Balloon School, Omaha, Neb.
FRF—On duty requiring regular and frequent aerial flights.
FSO—Report to Fort Sill School for Aerial Observers, Fort Sill, Okla.
GIT—Report to School of Military Aeronautics, Georgia Institute of Technology, Augusta, Ga.
GLC—Report to Gerstner Field, Lake Charles, La.
HHN—Report to Hazelhurst Field, Mineola, L. I., N. Y.
JMA—Rated as Junior Military Aviator.
JRC—Report to Jackson Field, Riverside, Cal.
KST—Report to Kelly Field, So. San Antonio, Tex. (When specified in the order, the number of the field is given in parentheses)
LDT—Report to Love Field, Dallas, Tex.
LHV—Report to Langley Field, Hampton, Va.
MAC—Report to March Field, Allesandro, Cal.
MAJ—Commissioned as Major, Aviation Section, Signal Corps.
MAT—Report to Mather Field, Sacramento, Cal.
MDO—Report to McCook Field, Dayton, Ohio.
MIT—Report to School of Military Aeronautics, Massachusetts Institute of Technology, Boston, Mass.
MJA—Commissioned as Major Air Service, National Army.
MJR—Commissioned as Major, Aviation Section, Signal Reserve Corps.
MSC—Report to Radio School, Maryland State Agricultural College, College Park, Md.
OBS—Attached to the Aeronautical Service as Observers.
OSU—Report to School of Military Aeronautics, Ohio State University, Columbus, Ohio.
PFO—Report to Post Field, Fort Sill, Okla.
PMT—Report to Park Field, Millington, Tenn.
PUP—Report to School of Military Aeronautics, Princeton University, Princeton, N. J.
PWM—Report to Payne Field, West Point, Miss.
REL—Relieved from present duty.
RSD—Report to Rockwell Field, San Diego, Cal.
RTR—Retransferred to organization attached to previous assignment to aviation duty.
RWT—Report to Rich Field, Waco, Tex.
SBI—Report to Scott Field, Belleville, Ill.
SAG—Report to Souther Field, Americus, Ga.
SGS—Report to Camp Sevier, Greenville, S. C.
SLA—Commissioned as Second Lieutenant Air Service, National Army.
SLR—Commissioned as Second Lieutenant, Aviation Section, Signal Reserve Corps.
SLT—Commissioned as Second Lieutenant, Aviation Section, Signal Corps.
SMM—Report to Selfridge Field, Mount Clemens, Mich.
SRC—Report to Columbia School for Radio Officers, New York City.
TFT—Report to Taliaferro Field, Fort Worth, Texas. (When specified in the order, the number of the field is given in parentheses)
TMA—Report to Taylor Field, Montgomery, Ala.
UCB—Report to School of Military Aeronautics, University of California, Berkeley, Cal.
UIU—Report to School of Military Aeronautics, University of Illinois, Urbana, Ill.
UTA—Report to School of Military Aeronautics, University of Texas, Austin, Tex.
VBW—Report to Vancouver Barracks, Washington.
WAC—Report to Aviation Concentration Camp, Waco, Tex.
WCS—Wire to the Chief Signal Officer upon arrival.
WDM—Wire, Director of Military Aeronautics, upon arrival.
WFO—Report to Wilbur Wright Field, Fairfield, Ohio.

Notes

Note 1—Report to places mentioned in order named for temporary duty.

Note 2—Report to Dayton, Ohio, Chief Prod. Eng. Dept., Dayton Savings & Trust Bldg.

Note 3—Report to Dayton, Ohio, Chief Technical Section.

Note 4—Report to Dayton, Ohio, District Mgr. Mutual Bldg.

Note 5—Report to Middletown, Conn., Gen. Supply Depot.

Note 6—Report to Middletown, Conn., Wesleyan University.

Note 7—Report to Army Balloon School, Arcadia, Cal.

Note 8—Report to Army Balloon School, Lee Hall, Va.

Note 9—Report to Balloon Detachment, Fort Munroe, Va.

Note 10—Report to Aircraft Production Depot, Buffalo, N. Y.

Note 11—Report to Aviation Repair Depot, Speedway, Indianapolis, Ind.

Note 12—Report to Capt. R. J. MacKenzie, Standard Aircraft Corp., Elizabeth, N. J.

Note 13—Report to Chemical Laboratory, Washington, D. C.

Note 14—Report to Approvals Officer, 1550 Woodward Ave., Detroit, Mich.

Note 15—Report to Students' Army Training Corps, Western Res. University, Cleveland, Ohio.

Note 16—Report to Students' Army Training Corps, Univ. of Va., Charlottesville, Va.

Note 17—Report to Students' Army Training Corps, Univ. of Minn., Minneapolis, Minn.

Note 18—Report to Students' Army Training Corps, New York University, New York, N. Y.

Note 19—Report to District Office, 480 Lexington Ave., New York, N. Y.

Note 20—Report to Balloon Detachment, West Point, Ky.

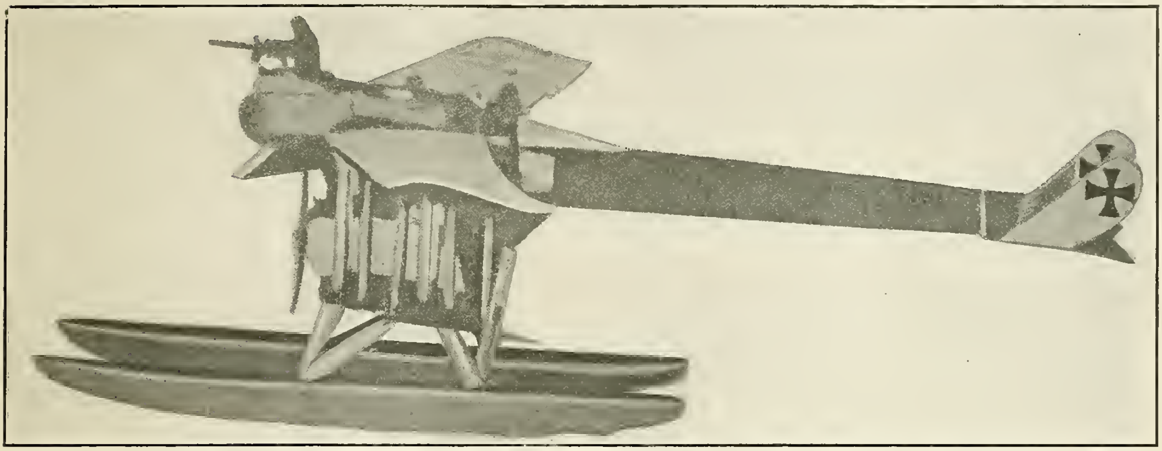
Special Orders Nos. 210-214 Inclusive

A

Alexander, James Franklin	CPA; DAP
Alford, John Gordon	SLA; EOT
Avery, Robert Pattison	SLA; RSD
Atkins, James Fillmore	SLA; KST
Alger, Edward Everett	SLA; PFO
Ashcraft, Edward Raymond	SLA; SMM
Adelsperger, Neal Dow	SLA; TFT
Alpine, Arthur David	SLA; EOT
Atkins, Charles M., 3rd	RSD
Addington, Edward P	SMM
Arthur, Ira W	PFO
Albright, Oliver	GLC
Austin, Eugene H	HHN
Alcorn, Kent Archibald	SLA; AAD
Akers, Claude	WFO
Abbott, Roy Wilks	SLA; BST
Apple, Addison A	WFO
Alexander, Marvis L	BST
Armentrout, Dale M	DMA
Armstrong, Russell B	WFO
Ashe, Clarence F	WFO
Anderson, Edwin F	LHV
Allen, Carl B	TFT
Ahearn, Clarence J	TFT
Ashley, Thomas W	WFO

B

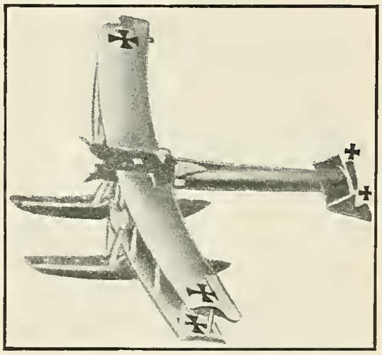
Baum, Charles Edwin	SLA; CRI
Baker, John F	DMA
Bell, Ned C	WFO
Bower, Claire A	SLA; KST
Bumstead, John H	WFO
Boyce, Charles Ward	SLA; APR
Berglund, Roscoe Lester	SLA; UCB
Barnard, William T	EOT
Bowen, Robert H	EOT
Bennett, Robert K	LHV
Bleser, Louis William	SLA; CRI
Brooke, Leon C	CWT
Bastian, Frederick Roth	SLA; EOT
Burns, Kenneth	SLA; ELA
Barrett, Alexander McC	CPA; VBW
Brown, Nugent Ezekiel	SLA; EOT
Berger, Carey Kingsbury	SLA; BST
Buell, Arthur Campbell	SLA; EOT
Burrows, Paul E	EOT
Byerly, Frank, Jr	EOT
Bramlette, Milton N	EOT
Butler, Judson Rea	SLA; EOT
Baer, George V	FOB
Blaney, Lewis	CPA
Brown, Charles Morris	SLA; GLC
Bergan, Knute Washington	SLA; GLC
Beekley, Archie Gordon	SLA; KST
Boswell, Haden Edwards	SLA; GLC
Boylston, Joseph Edward	SLA; ELA
Bare, Leslie Thompson	SLA; SMM
Baker, Quin K	WFO
Best, Harvey George	SLA; PMT
Barnett, Nelson D	BST
Benson, Charles Berverley	FLA; CUI
Benjamin, Walter E	DMA
Barnes, Ralph Winslow	SLA; RWT
Buehler, Fred Jacob	SLA; GLC
Brigham, Marshall Henry	SLA; UIU
Brown, Oscar	CGC
Bean, Joseph H. H	CGC
Baymiller, Clyde Chester	SLA; CFT
Briscoe, Frank	CPA; DAP



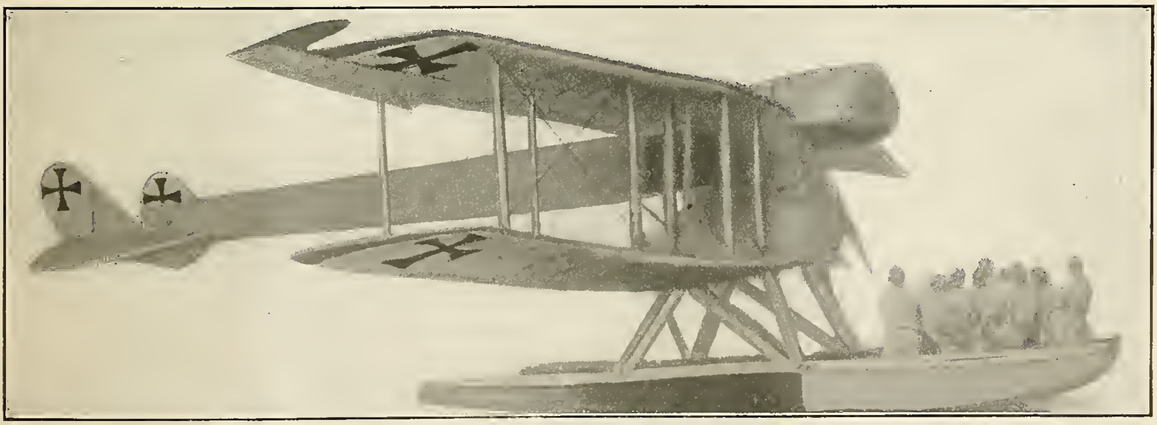
Was ist das? A German nightmare seaplane designed, apparently, to be offensive to the vision as well as the enemy. The tractor airscrew can be seen in the front of the small nacelle underneath the gunner's perch. The machine is believed to be called the "Ursinus," possibly because it was built by the motor firm of that name, and is said to bave been designed by the Editor of "Flugsport"

Barnes, Earl D	WFO
Butterworth, Benjamin F., Jr	WFO
Bird, Emerson P	TFT
Bowers, Eugene	TFT
Brannum, Claude J	TFT
Braymen, Kenneth C	TFT
Boyle, Frank Joseph	SLA; FOB
Bushman, Francis L	WFO
Bonsal, Stephen, Jr	REL; EOT
Battles, Winthrop H	HHN
Bacon, Leonard	SRC
Beeks, Herbert S	SMM
Budd, Thomas G	WFO
Buffington, James, Jr	EOT
Baker, Rohert H	PFO
Borden, Frank Harris	SLA; LDT
Brown, William T., Jr	EOT
Blind, Charles Alhert	BFT
Beymer, Harold S	WFO
Benton, Herhert E	BST
Buckley, James W	TFT
Burgess, Walter K	GLC
Bennett, Thomas E	WFO
Boggs,. William G	DMA
Bates, Lew A	BST
Bartlett, Frank M	CPA
Benvie, Frank W	WFO
Butterfield, Arthur D	MJA
Baird, Walter E	CWT
Belknap,. Clifford B	EOT
Budd, Thomas G	WFO
Broman, Victor	EOT
Burnett, Hunter P	DIK
Bidwell, Ira Monroe	SLA; GLC
Blair, Elmer W	CGC
Bleser, Louis W	BFT
Butler, Lawrence O	PFO
Burruss, George Henry	SLA; RSD
Boggs, Paul R	WFO
Burton, Frederick H	CGC
Bell, Frank F	CPA
Brones, Frank L	WFO
Barnett, Nelson Dater	SLA; KST
Bell, Charles F	GLC
Butler, Morgan	Note 2
Beverly, Efford Armona	SLA; Note 13
Bartholomew, Robert	Note 3
C	
Chireleison, Frank	WFO
Cunningham, John R	DMA
Chidlaw, Carrol Hughes	SLA; KST
Clark, Elmer Cutler	SLA; RSD
Clements, Theron Alvord	FLA; DAP
Carey, Francis James	SLA; SMM
Clark, Howard Edward	SLA; SMM
Cunningham, William Burt	SLA; SMM
Chenoweth, Bertram W	APR; CUI; Note 1
Cleveland, Walter Eugene	SLA; CRI
Colson, Joseph George	SLA; GLC
Crawford, Ira Melton	SLA; RSD
Cerruti, Frank Anthony	FLA; DAP
Coleman, Andrew Hartwell	SLA; ELA
Clark, Roy Ersel	SLA; ELA
Courtney, Edward William	SLA; ELA
Cerreta, Joseph Murray	SLA; ELA
Culver, Rufus Burr	SLA; KST
Cardoff, Earl Frederick	SLA; KST
Curtis, Tohin S	DMA
Carhery, Joseph E	KST
Camphell, George Leroy	SLA; RSD
Carey, Homer Frank	SLA; PMT
Cushman, Stewart A	EOT
Connolly, Maurice	WFO
Cranford, Russell A	FRF
Copenhaver, Edwin H., Jr	CGC
Clark, John F	DMA
Campbell, John Ray	SLA; GLC
Clough, Oscar L	KST
Cote, Charles L	WFO
Clark, Harold M	RSD
Chambers, Harold Cooke	SLA; EOT
Clark, Carl Francis	KST
Casey, Joseph Daniel	SLA; SBI
Cleary, Ansel Rutherford	SLA; GLC
Church, Warren George	SLA; GLC
Coe, Alfred L	FRF
Chittenden, Gerald	UTA
Cox, Gilbert H	SAG
Cook, Horace L	WFO
Connell, J. Weed	SAG
Carmody, Arthur R	BST
Cleveland, Walter E	WFO
Crooks, William R	EOT
Caraway, Talmadge E	GLC
Clark, George A	TFT
Craig, Britt	WFO
Craighead, Phillip B	WFO
Clopeck, Frank	EOT
Coulter, Wilmer V	WFO
Cross, Eugene H	WFO
Cannon, Robert H	EOT
Connell, David E	WFO
Clarke, Frederick L	EOT
Corkan, Dudley C	TFT
Critz, Rohert, Jr	KST
Carr, Richard M	GLC
Cleveland, Walter E	WFO
Clark, William P	BFT
Cruickshank, Bruce D	EOT
Cocke, Dudley B	PFO
Connelly, Rohert M	CWT
Crawford, Ira M	GLC
Conzett, Charles Nott	SLA; CJW
Coulter, Wilmer V	WFO
Cross, John M	CGC
Craighead, Philip B	WFO
Carney, Herbert Stanton	SLA; GLC
Caskey, Jack Pearson	SLA; GLC

(*Continued on page* 185)



The German Freak Seaplane viewed from another machine in the air



Another view of the quaint German seaplane which is faintly reminiscent of an experimental aeroplane built in the early days of the war, and called the "Sparrow"

FOREIGN NEWS

GREAT BRITAIN

On Sept. 8 the sky was overcast, and there were frequent rain storms with high wind. Our aeroplanes carried on their work for the artillery with difficulty, and also accomplished a number of reconnoissances and contact patrols. Five tons of bombs were dropped during the day.

There was no flying at night. The activity of the enemy's machines was very slight, but we brought down five and drove two down out of control. None of our machines are missing.

Owing to continued heavy rainstorms on Sept. 10, aerial observation was very difficult. In spite of a very high wind some work was accomplished during the fine intervals which occurred from time to time.

Several reconnoissances were carried out by our machines, and some photographs were taken. One of our aeroplanes failed to return.

An official statement issued September 14, describing the British aerial activities over the battle area, says:

On September 13 clouds and rain again greatly interfered with operations in the air. During the brighter interval a number of photographs were taken, and our machines made observations whenever possible for the artillery fire.

Contact patrol work had to be carried on at a very low altitude. One enemy machine was brought down in air fighting during the day and two were driven down out of control. At night two hostile night bombing machines were brought down.

Ten tons of bombs were dropped by us in the course of the twenty-four hours. All our machines employed during this period have returned.

In conjunction with the attack by the American First Army the following operations were carried out: On September 13, in addition to the bombing reported in the communique of September 13, nearly a ton of bombs were dropped on the railways at Arnaville and Metz-Sablons. Two enemy aircraft were shot down out of control.

On the night of September 13-14 attacks were carried out on the railway at Courcelles, but owing to the weather results were difficult to observe.

On September 14 the railway at Metz-Sablons and Ehrang and the Buhl aerodrome were attacked with good results. Three direct hits were obtained on the railway at Ehrang and one on a shed at the Buhl aerodrome. Nearly six and one-half tons of bombs were dropped during the day and night. One of our machines is missing.

The statement of September 15 says:

On the battle front, in addition to the bombing reported in yesterday's communique, the following bombing operations were carried out:

Two further attacks were made on Metz-Sablons in the late afternoon and many direct hits were obtained on the railway triangle, on the workshops, the gas works and the barracks. The Buhl aerodrome was also attacked with good results.

Heavy attacks were kept up throughout the night of September 14-15 on Metz-Sablons, Courcelles, Ehrange, Saarbrucken, Kaiserslautern and the aerodromes at Frescaty and Boulay. Many direct hits were obtained on the railway, especially at Metz-Sablons and Courcelles, and several fires were started at Metz, Kaiserslautern, the Saarbrucken station, and the Frescaty aerodrome. Three of our machines failed to return.

This morning the railway triangle at Metz-Sablons was again attacked and many direct hits were obtained. Enemy scouts were active. Bombs were also dropped on the Buhl aerodrome. Three of our machines are missing.

The Daimler Works at Stuttgart were also attacked with good results. During this raid twenty enemy aircraft were encountered and two were destroyed. Our machines all returned safely.

The total weight of bombs dropped during the twenty-four hours was more than twenty-seven tons.

On September 14 the enemy aircraft showed more activity on some parts of the British front than for several days past. In air fighting four hostile machines were destroyed. In addition, two enemy two-seaters were burned on the ground in the course of a successful attack carried out by our airmen from a very low height upon an aerodrome south of Lille. Four German balloons were shot down in flames. Two of our machines are missing.

A good deal of photography and artillery observation work was accomplished, together with a number of contact patrols.

Twenty-one German towns have been bombed by the British independent air force during the month of August. The objectives were railway stations, chemical and other factories and blast furnaces, and the towns included Frankfort, Mannheim, Metz-Sablons, Saarbruck, Thionville, three times each; Burbach, Coblenz, Cologne, Darmstadt, Karlsruhe, Luxembourg, Offenburg and Treves.

The total weight of bombs dropped in these raids was more than 100 tons.

During the last three months the independent air force has made 249 aerial raids over German territory. The extensive damage done has been confirmed by photographs in many cases. The German territory thus brought definitely into the war zone represents a belt in the Rhine Valley approximately 250 miles in length.

On September 15, with the improving weather, there was a marked increase of aerial activity. Enemy machines were encountered in large formations on the German side of the line and there were many combats.

Twenty-nine hostile aeroplanes were destroyed in the air fighting during the day and seven were driven down out of control. In addition, a large enemy night bombing machine was brought down after dark. Sixteen of our machines are missing, including two night flying aeroplanes.

Four enemy aerodromes were successfully attacked and heavily bombed, one by day and three by night. During the twenty-four hours thirty tons of bombs were dropped by us.

Our balloons took advantage of the clear atmosphere to send down many useful observations, and our aeroplanes engaged in reconnaissance, photography and observation for artillery fire carried out much valuable work.

On the battle front on the night of September 15-16 four hostile aerodromes were heavily and repeatedly attacked by our machines with excellent results. Four fires were started, three hostile machines on the ground were wrecked, two hangars were completely demolished and sveral more hangars received direct hits. A transport convoy was hit four times.

The railways at Metz-Sablons were again bombed and a fire started. The railway junctions at Mainz and the sidings at Karlsruhe were successfully attacked.

Very good results were observed on both targets, and at Karlsruhe, where three and a half tons of bombs were dropped, seventeen direct hits were obtained. During the night 350 bombs, totalling sixteen and a half tons in weight, were dropped.

All of our machines returned.

There was great aerial activity all along the British front September 16 and our machines were busily engaged in every department of their work. Photographic reconnaissances, both of forward and distant areas, were carried out with great completeness in spite of strong opposition, and the number of aerial photographs taken exceeds any previously recorded total for one day.

Nearly twenty-four tons of bombs were dropped by day, and fifteen tons the following night, on aerodromes used by the enemy's night flying aeroplanes and on railheads and dumps.

The fighting was intense all along the front throughout the day, combats taking place a considerable distance east of the lines. Forty-five hostile machines were brought down by our airmen. Of these, seven were brought down in one fight by one of our squadrons. Twenty other German machines were driven down out of control. In addition, one hostile aeroplane was shot down by our anti-aircraft guns. One hostile balloon was destroyed.

Sixteen of our machines are missing.

On the afternoon of September 16 our squadrons made two separate attacks on the aeroplane works and chemical factory at Mannheim with excellent results. The enemy attacked our machines over the objectives. Three of our machines are missing.

A German home defence aerodrome at Hagenau was attacked by a squadron and bursts were observed on and near the hangars. One hangar was seen in flames. All our machines returned.

Last night our machines attacked three hostile aerodromes with bombs and machine-gun fire. Good results were obtained.

The railways at Metz-Sablons and Treves were very heavily attacked and three fires were started at Metz-Sablons. Bombs were dropped all around the Treves station. The station at Frankfort was also heavily attacked and bombs were dropped with good effect.

Sixty tons of bombs have been dropped in the last three days.

The official report for September 18 says:

"During the last forty-eight hours Royal Air Force contingents working with the navy have dropped thirteen tons of bombs on the docks at Bruges and on the Maria Alter aerodrome. Eleven enemy machines and a kite balloon were destroyed, and seven machines driven down out of control. Four of our machines are missing.

"A formation of five enemy seaplanes approaching the east coast was met and engaged by two seaplanes and two aeroplanes. One German machine was destroyed, the others retiring eastward."

After their heavy losses on the previous day enemy aircraft were less active yesterday. The weather on the British front was fine, with a strong wind.

Our machines were at work all day carrying out reconnaissances and photography far behind the German lines; observing and reporting the effect of our artillery fire and bombing enemy aerodromes, ammunition dumps and other selected targets. Eleven hostile machines were destroyed and five others driven down out of control. Ten of our machines are missing.

At night we heavily bombed three German aerodromes, where squadrons working in the battle area are located. Three hostile night-bombing machines which came over our line were detected by our searchlight, attacked from the air, and brought down. One of our night-flying aeroplanes is missing. The total weight of bombs dropped by us during the twenty-four hours was twenty-nine and a half tons.

Field Marshall Haig gave out the following on September 19:

"Yesterday the enemy aircraft activity was slight. Four hostile planes were brought down and three others were driven down out of control. Four of our machines are missing.

"Our planes kept in touch with the advancing troops and assisted in the attack of bombing and with machine-gun fire, as well as by reporting many targets to the artillery. During the twenty-four hours sixteen tons of bombs were dropped."

ITALY

A squadron of bombing machines dropped several tons of bombs on the Navy Yard of Pola with very good results on September 20. Two enemy aeroplanes were brought down and three others forced to land out of control.

Major Gabriele D'Annunzio, at the head of the pilots who made the raid on Vienna, was presented by King Victor Emanuel, the High Decoration of "Officer of the Military Order Savoy." A dozen of the British pilots on the Italian front received the Italian silver medal for valor.

After the ceremony there was the largest review yet held of the Italian Flying Corps.

The aerial activity of September 22-24 was handicapped by the bad weather prevailing on the whole front; nevertheless, three enemy aeroplanes were brought down by our pursuit machines.

Major Gabriele D'Annunzio, starting from the Italian front on September 26, flew to Paris, crossing the Alps. It is understood that he will take charge of a very important project.

The official statement issued by the War Office on Sept. 20 says: "Our aviators bombed Pola."

GERMANY

The German official statement says:

"Lieut. Buechner achieved his thirtieth aerial victory.

"On Sept. 23rd Lieut. Rumey gained his forty-first aerial victory."

This statement says that seventy-nine persons were killed and 113 injured during the allied air raids.

The statement of Sept. 26th says:

"Seven aeroplanes were shot down out of enemy squadrons which attacked Frankfort-on-Main and Kaiserlautern."

MODEL NEWS

Edited by John F. McMahon

Model Aeroplane Building as a Step to Aeronautical Engineering

(Construction of a 20-Foot Glider)

THE glider about to be described is for use in getting our first feeling of real flying. Of course the speed will not be as great as would be attained by a powered aeroplane, but it is much the same as the rolling chair used by infants in learning to walk. It leaves the ground but stays at a safe distance and moves so slowly that if an accident should occur, the striking impact would not be great and nothing other than a little shaking up would result.

To fly a glider, the operator can select one of two methods. One is to select some piece of ground a little higher than the surrounding country, face into the wind, run and cast off at the edge of the rise of ground, the glider will then carry you to a distance of about 200 or 300 feet, according to the skill of the operator.

The other method is to fasten ropes to the end of each wing and have it towed by a few men or a motorcycle. This method must not be attempted until the operator has practiced the other style, because there is danger of the motorcycle towing too fast with the result that the glider will shoot high in the air and the operator not knowing how to right it, it will come crashing to the ground with perhaps fatal results.

We will take up the operation of a glider fully in a later article.

The glider is made up mainly of spruce of different sizes and thicknesses, which can be purchased cut to the desired sizes at any lumber yard. Of course the finishing work can be easily done by the builder. I don't think it necessary to warn the reader to be more careful when constructing or assembling the different parts, then when building the small models, because we know that this machine is to carry the operator and must be made strong, as well as light as possible. The glider should not weigh more than eighty pounds.

The construction of the wings are somewhat similar to our double surfaced model wings. The main spars are made of spruce 2½" x 1½" and 25 feet 11 inches long. It will not be possible to get a piece of lumber of this length without knots or flaws, so it is necessary to piece it and wrap the joints as shown in the front view of the spar shown below the wings. If the builder is fortunate enough to secure lumber 13 feet long the glider can be made in two halves oarting the middle and joined by a fitting made of heavy gauge sheet iron as shown at the left of the cut.

If this method is employed, the center rib in the wing must be omitted and this part will remain uncovered when the glider is finished. Cross section of the front and rear spars are shown in figures to the right of the wings.

The ribs are made of two strips of spruce ½" x 3/16" and 5 feet 1½" square are glued and nailed between the ribs to hold the strips in shape and to reinforce them.

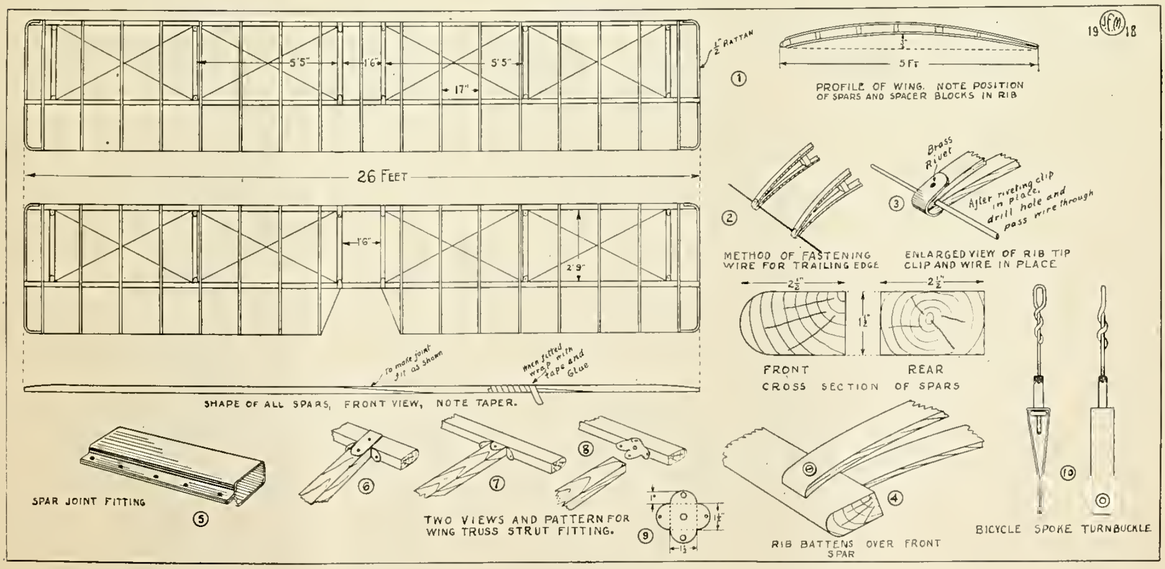
All ribs should be made before fastening to the spars. When making the ribs, a piece of lumber 2" thick should be cut to the shape of the bottom strip. This is done by drawing a line horizontally and then measuring a distance of 3" from this line. A curve should then be made starting and ending at each end of the line and reaching the height of 3". The lumber is then sawed along this curve, which leaves a mould to work on.

To make the ribs, lay one strip of wood on the mould with the convex side, nail and glue the blocks in place, then lay this part of the rib on the concave side and nail the other strip to the blocks. When all ribs are made, slide them on the rear spar to the proper places and fasten in place. The front spar is then fastened to the front edges of the ribs.

To strengthen the wing it must be reinforced by a sort of bridge truss arrangement. It is then necessary to put struts 1½" square between the spars to take the compression when the wires are tightened. The method of fastening the struts and a pattern for the strut fastening is shown in Figures 7, 8 and 9. The plate is fastened to the spars first, by a 1" wood screw, the top and bottom tongues are then bent out and the strut fastened in place by a 3/16" bolt. The other two tongues are left for fastening the truss wires in place. The truss wire is 16 gauge piano wire. (The strut shown in Fig. 6, is reinforced by another strap around the spars and fastened to the strut. This is done to the four struts in the center of the machine, because these members must take the full weight of the operator in flight.)

To tighten the wires, it is necessary to have some kind of an arrangement to take up the slack. This can be done by making turnbuckles from ordinary bicycle spokes and a strip of 16 gauge sheet metal. The turnbuckle is made as shown in Figure 10. When trussed properly the ends can be put in place. These are made of ½" round ratton fastened to the front spar, bent to a convenient curve, fastened to the rear spar and then fastened to the end rib after bending at right angles. When this is finished the trailing edge is fastened in place. This consists of piano wire running through each rib at the rear tip as shown in Figures 2 and 3.

(To be Continued)


5'5"
1'6"
5'5"
17"
½" RATTAN
19 JFM 18
①
5 FT
3"
PROFILE OF WING. NOTE POSITION OF SPARS AND SPACER BLOCKS IN RIB
26 FEET
1'6"
2'9"
Brass Rivet
②
③
After riveting clip in place, drill hole and pass wire through
METHOD OF FASTENING WIRE FOR TRAILING EDGE
ENLARGED VIEW OF RIB TIP CLIP AND WIRE IN PLACE
2½"
1½"
2½"
FRONT
REAR
CROSS SECTION OF SPARS
To make joint fit as shown
When fitted wrap with tape and Glue
SHAPE OF ALL SPARS, FRONT VIEW, NOTE TAPER.
SPAR JOINT FITTING
⑤
⑥
⑦
⑧
TWO VIEWS AND PATTERN FOR WING TRUSS STRUT FITTING.
⑨
1"
1½"
1½"
④
RIB BATTENS OVER FRONT SPAR
⑩
BICYCLE SPOKE TURNBUCKLE

Aeronitis

Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

Intelligent Female (to balloon officer of observation sausage): I wonder you don't have a ladder or a fire escape or something of that sort, instead of just having that rope to climb up and down."

Aerodrome Proverbs

It's the last bump that breaks the chassis strut.
A switch off in time saves nine days in the repair shop.

Absent without Leave

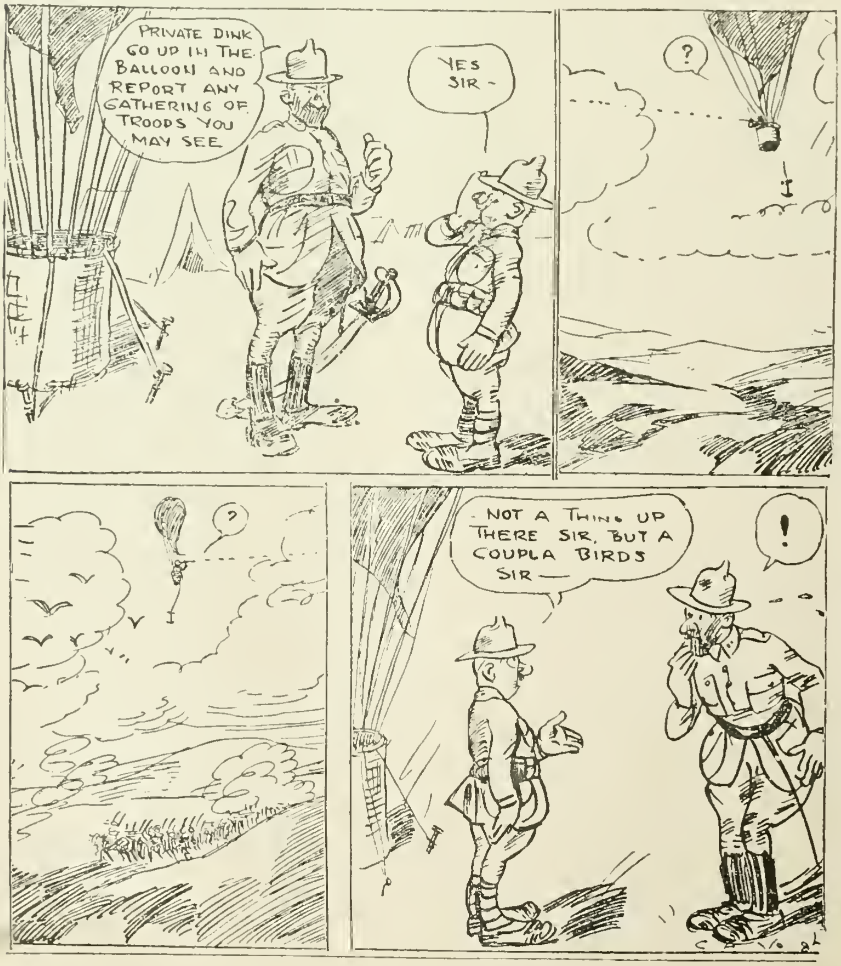
Mess President: "Cook that dinner today on the new gasoline stove, Johnson."

Johnson: "Well, sir, I begun to, but it went out."

M. P.: Well, light it again."

Johnson: "Yes, sir, but it's not back yet. It went out through the roof."

And, yea, it
Hath been said
By them of
Frequent times
That forgiveness,
Like garters,
Loose their snap
When they are
Stretched
Too far.
A mother-in-law's
Womanly dignity
Is a thing for
Angels and
Cadets to titter


PRIVATE DINK GO UP IN THE BALLOON AND REPORT ANY GATHERING OF TROOPS YOU MAY SEE
YES SIR -
?
?
- NOT A THING UP THERE SIR, BUT A COUPLA BIRDS SIR —
!

Lazy Lines

By Lynn

Over in the
Threes of Life

* * *

The war was over
& as I kissed
Me wife good-bye
After doing 10
Hours nightshirt
Fatigue totin'
The twins back and
Fro I sorta felt
Like going on sick
Report me self,
But the ol' lady
Pestered me mighty
To see if her
Ration returns wus
In at the corner
Grocery and also
About gettin' a new
Issue of summer
Unions for the
The triplets.

* * *

I had a busy day
Of it and knocked off
Too late to reach
The shack for chow
So I figured I
Might as well make
A night of
It with some of the
Birds and other
Fowls.

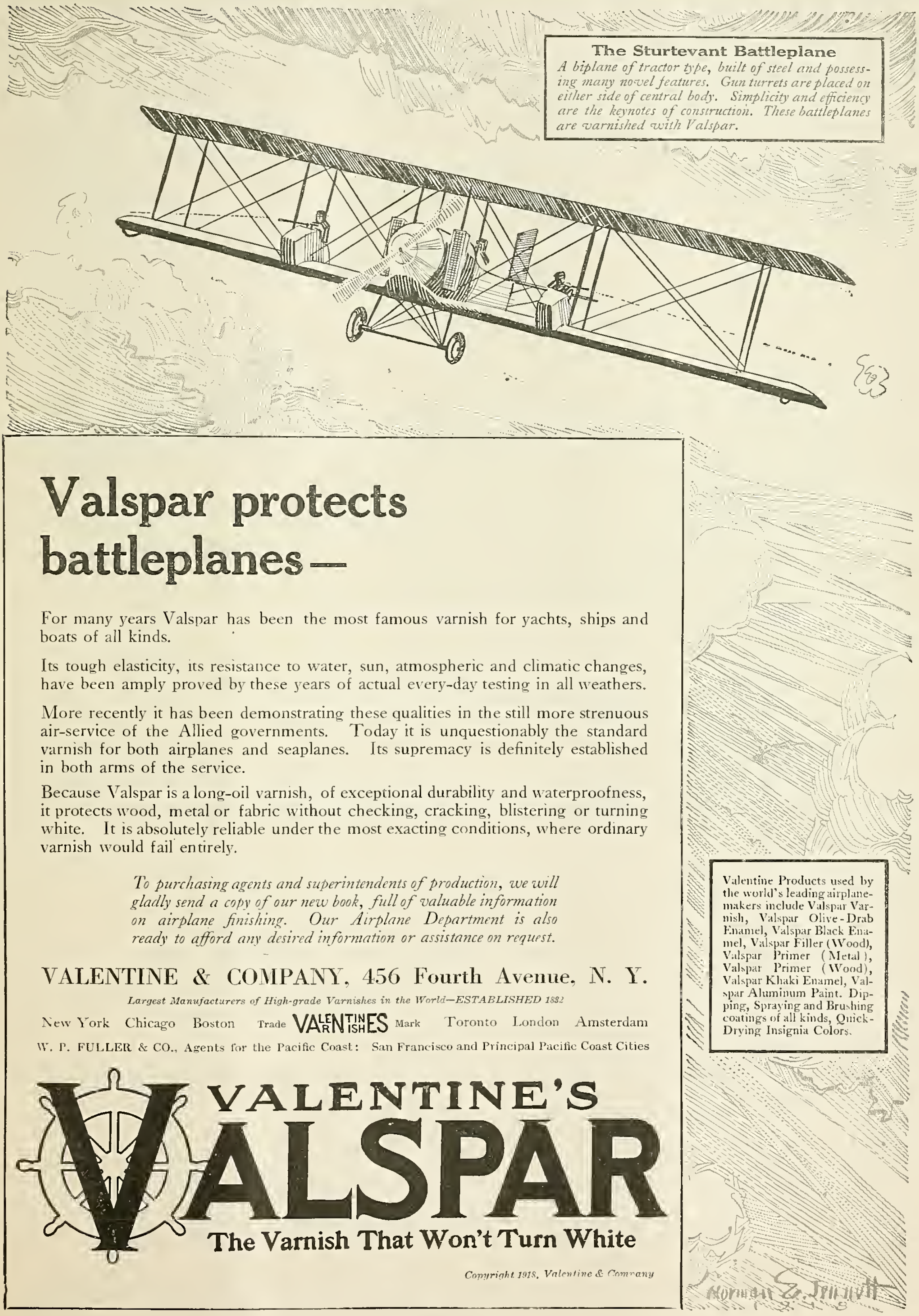
* * *

When I got home the
Top Cutter-me
Mother-in-law gave
Me almighty hell
On three charges:
Missing evening
Retreat, being out
In town without
Pass and not
Answering "Heah"
At inspection.
She talked putty
Rough and gave
Me fo' days provost
& confined to
Quarters for a like
Period.

* * *

As reveille blew
I woke up in
A sweat—'twas only
A dream and
The Ramblings of an
Idle Brain, as
Sayeth the Poets
& Poetesses.
Thank Hannah! I was
In my upper bunk
In peaceful ol'
France with
Only the noise of
The cannon and
Other aviation field
Equipment to
Annoy me!

—*Exchange*



The Sturtevant Battleplane

A biplane of tractor type, built of steel and possessing many novel features. Gun turrets are placed on either side of central body. Simplicity and efficiency are the keynotes of construction. These battleplanes are varnished with Valspar.

Valspar protects battleplanes—

For many years Valspar has been the most famous varnish for yachts, ships and boats of all kinds.

Its tough elasticity, its resistance to water, sun, atmospheric and climatic changes, have been amply proved by these years of actual every-day testing in all weathers.

More recently it has been demonstrating these qualities in the still more strenuous air-service of the Allied governments. Today it is unquestionably the standard varnish for both airplanes and seaplanes. Its supremacy is definitely established in both arms of the service.

Because Valspar is a long-oil varnish, of exceptional durability and waterproofness, it protects wood, metal or fabric without checking, cracking, blistering or turning white. It is absolutely reliable under the most exacting conditions, where ordinary varnish would fail entirely.

To purchasing agents and superintendents of production, we will gladly send a copy of our new book, full of valuable information on airplane finishing. Our Airplane Department is also ready to afford any desired information or assistance on request.

VALENTINE & COMPANY, 456 Fourth Avenue, N. Y.

Largest Manufacturers of High-grade Varnishes in the World—ESTABLISHED 1832

New York Chicago Boston Trade VALENTINES VARNISHES Mark Toronto London Amsterdam

W. P. FULLER & CO., Agents for the Pacific Coast: San Francisco and Principal Pacific Coast Cities

VALENTINE'S VALSPAR

The Varnish That Won't Turn White

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Valentine Products used by the world's leading airplane-makers include Valspar Varnish, Valspar Olive-Drab Enamel, Valspar Black Enamel, Valspar Filler (Wood), Valspar Primer (Metal), Valspar Primer (Wood), Valspar Khaki Enamel, Valspar Aluminum Paint. Dipping, Spraying and Brushing coatings of all kinds, Quick-Drying Insignia Colors.

AERONAUTICAL EQUIPMENT, INC.

ISRAEL LUDLOW, *President*

EXPORT **MILL AND MANUFACTURERS' AGENT** **IMPORT**

TELEPHONE 1344 RECTOR

33 WEST 42d STREET NEW YORK, N. Y.

WE SPECIALIZE

3 ply, 5 ply, 9 ply and 15 ply, birch, mahogany, walnut and red gum waterproof veneers. Our products have officially passed Government test of boiling of twenty-four hours and baking twenty-four hours. Capacity 30,000 square feet daily. In an official Government report on sample three and five ply panels submitted by us for test, it was stated—

> **"Boiling tests and salt water soaking tests as follows were made on each specimen: Specimens were boiled for 8 hours, then baked for 24 hours at 100 deg. C.; specimens were soaked in salt water (4% salt by weight) at room temperature for 24 hours and then baked for 24 hours at 100 deg. C.**
>
> **"Results:—The glue held firmly in all tests. Neither the boiling nor the salt water soaking tests caused any indications of separations of the plies of the veneers tested."**
>
> **Dated, March 30th, 1918.**

Laminated wing beams of spruce. We have under contract a supply of aeroplane spruce and could undertake to manufacture 50 sets of 8 wing-beams daily. In an official Government report on a sample wing-beam section submitted by us for test, it was stated —

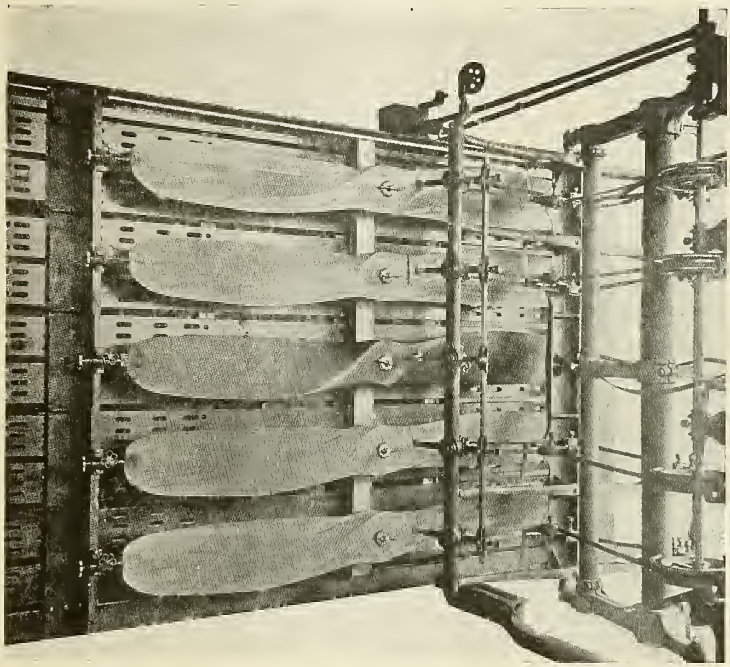
> **"Conclusion:—These beams carried a much greater transverse load than solid wood beams of the same material and section. The glue joints between web and flanges are stronger in shear than the web section, and the glue had fairly good waterproof qualities. These beams show the superiority of the laminated construction over the solid construction as to strength and great saving in material."**
>
> **Dated, March 11th, 1918.**

We offer single ply birch, maple, walnut, mahogany and red gum **in sizes cut** to order.

SHIPPER IN CAR LOTS OF

Spruce, Ash, Oak, Birch, Cherry and other manufactured aeroplane lumber.

IMPORTER OF CLAUDEL CARBURETORS



The Curtis Dreadnaught Propeller Cutting Machine, Model 55

THIS machine cuts four blades at a time, and cuts closer and more accurate than any other machine in the market.

It finishes the hub the same as all other parts of the blade.

It cuts with the grain of the wood.

It does not require a metal model; just a regular stock blade is sufficient.

It does not bump over the pattern.

It is manually operated, which gives it the advantage of the human touch required on accurate work.

The hand work required after this machine is from 3½ to 4½ hours on each blade.

It leaves just enough wood for cleaning up.

Curtis Machine Corp.
Jamestown, N. Y.

(*Continued from page 179*)

Chiles, Chester A.	CWT
Cate, Theodore W	BST
Chisolm, Henry	EOT

D

Duchac, Carl Oliver	SLA; LDT
Dulin, Garrettson	SLA; MAC
Duffus, William Clare	SLA; DAP
de Gozzaldi, Richard Silvie	SLA; LDT
Day, Olin Lincoln	SLA; RSD
Doane, John Haynie	SLA; LDT
Dreyer, Walter	FLA; UCB
Durar, George H	EOT
Dunn, Thomas F	SMM
Dunn, Stanley M	PFO
Duke, Daniel F	TFT
Denison, George K	TFT
Denny, Hugh R	FRF
Duvall, Easton William	SLA; SMM
Dupre, Naason K	BST
Donaldson, Harold R	BST
Davidson, Robert M	TFT
Dean, Alexander	SLA; CUI
Dickens, George R	WFO
Dean, Thomas Jefferson, Jr	SLA; EOT
Dinger, Jean T	DMA
Denham, Louis Bradford	SLA; EOT
DeLamatre, Harry Clayton	SLA; CJW
DeLin, Martin	EOT
Douthitt, Laidley Ellis	SLA; KST
Dawson, John Charles	SLA; KST
Davis, Homer H	WFO
Davis, Frank Thomas	SLA; FOB
Drake, George H	EOT
Dahl, Newton Arnold	SLA; ELA
Dougherty, Gordon W	EOT
Downey, James F	WFO
Dale, Russell C	BFT
Dick, Guy H	WFO
Day, Paul Lyon	SLA; GLC
Davis, Harry Bascom, Jr	SLA; RSD
De Vore, Ralph R	CWT
Delaney, John J	CGC
Dungan, Edmond D	CGC
Duffield, Leroy B	TFT
Dimmick, Harold E	GLC
Davis, Harris E	WFO
Davis, Guy H	EOT
Duffield, John	SLA; KST
Dugliss, Malcolm	EOT
Doyle, Frank Butler	SLA; EOT
Downey, James F	WFO
Dohson, Matt H	CGC
Doherty, George D	GLC
Davidson, William G	BST
Davis, Leland W	EOT

E

Emmons, Claude Edward	FLA; DMA
Eldredge, Windsor	SLA; CGC
Ernst, Norman C	WFO
Eickenherg, Philip	SLA; DAF (2)
Evans, Dean Peoples	SLA; TFT
Ewell, Thomas J	TFT
Erney, Frederick G	CWT
Eaton, Charles F	ASM
Evans, Floyd W	TFT
Evans, George Elwood	SLA; RSD
English, Frank J	WFO
Earl, Kenneth A	WFO
Emmons, Bernard W	DMA
Elliott, Lawrence M	UIU
Evleth, Raymond Earle	SLA; LDT
Evans, Christopher C	GLC
Everett, Roberts	EOT
Elliott, Clyde Robert	SLA; ELA
Ettenger, Edwin L	LHV
Earl, Kenneth A	WFO
Emig, Howard Abraham	FLA
Ely, Newell D	BST
Ewan, Charles V	BFT
Ehlers, George W	WFO
Eldridge, Earl W	CGC

F

Fulke, Frank L	GLC
Frith, Edwin H	KST
Flather, William James, Jr	FLA
Fenwick, Herbert F	EOT
Foss, Alden S	EOT
Friedlander, Harold H	EOT
Fechet, James F	DMA; KST; WDM; Note 1
French, Leigh H	DAP
Faucher, Joseph Augustine	SLA; KST
Frank, Walter H	JMA
Frees, Arthur Lee	FLA; BST
Frew, Ralph Charters	SLA; SMM
Freydig, Paul E	RSD
Ferguson, Earl Leo	SLA; TFT
Fitzpatrick, Francis E	CGC
Farrell, John B	TFT
Flinn, Earle F	TFT
Forrest, Robert P	WFO
Fleet, Reuben H	WFO
Fillot, Alexander M	CGC
Farley, Bernard Francis	SLA; KST
French, Seth T	CWT
Frothingham, Newton S	HHN
Farris, William C	BST
Fay, Wallace M	TFT
Fisher, Robert L	WFO
Finsterwald, Verne Harrison	SLA; LDT
Forward, DeWitt Arthur	SLA; CRI
Forsyth, Ralph Ernest	SLA; ELA
Freear, Hiriam Lamar	SLA; ELA
Foster, William C	SMM
French, Donald A	EOT
Frelinghuysen, Frederick T	FLA

G

Goodenough, Lewis Eldridge	SLA; ELA
Gregory, Joseph Van Clief	SLA; LDT
Gifford, John	SLA; KST
Gardner, Thomas Adrian	SLA; KST
George, George B	KST
Garrett, John W	SMM
Gardener, Allen Wynand	FLA; VBW
Guillaudeu, Dudley	REL; DMA
Gilson, Fred Edward	SLA; KST
Greene, Oscar Kendrick	SLA; UTA
Guilford, Edward Higley	FLA; DMA
Green, Leroy Seeman	SLA; PFO
Green, Gerald R	WFO
Guenther, Karl D	BST
Gasaway, Kenneth	WFO
Graham, Charles, Jr	TFT
Garwood, Sterling M	CGC
Goodwin, Grover	CGC
Greer, Jack	CGC
Glover, James E	TFT
Guppy, George	SAG
Grafa, Clare	CWT
Grethen, John P	WFO
Gallagher, Robert T	WFO
Goddard, George W	LHV
Gillespie, Franklin S	CGC
Grieh, Clarke	FLA
Garman, Ray Lin	SLA; GLC
Goss, Edgar K	BST
Gardner, James E	EOT

H

Hopkins, Julian B	HHN
Hagan, Thomas Henry	SLA; EOT
Hewes, Harry Philips	FLA; DAP
Hart, Howard M	FRF
Heptig, William August	SLA; LDT
Hunter, John Ackley	SLA; PMT
Hamilton, Jack	CPA; VBW
Harper, Floyd Kenneth	SLA; SAG
Holmes, Wayne M	WFO
Holhrook, Sidney Walace	SLA; LDT
Harvey, Robert B	TFT
Hogue, Mark C	TFT
Hintz, John Emil	CPA; VBW
Howell, James Clancy	SLA; EOT
High, Lennie Leroy	SLA; LDT
Handy, John C	PFO
Henry, Robert Lee	SLA; SAG
Hathaway, Mortimer Delano	SLA; AAD
Harold, Eugene L	WFO
Howard, John C	WFO
Hanlon, William J	TFT
Henderson, Elmer J	TFT
Hillhouse, John G	TFT
Herrink, Louis Shepard	SLA; SMM

Hosack, Carl Irving	SLA; SMM
Hasford, Carl Boyce	SLA; SMM
Hudkins, Edgar Fernando	SLA; SMM
Hopkins, Andrew Simpson	SLA; EOT
Harding, William K., Jr	CWT
Hastings, Edward R., Jr	CWT
Haworth, George W	CWT
Holborn, Clarence E	CWT
House, Edwin J	RTR
Harvey, William, Jr	CPA
Hamer, Bert L	WFO
Hooker, Roger Wolcott	SLA; TMA
Hezlett, Edward Harold	SLA; TFT
Harley, Wilbur H	TFT
Hart, Elwood Neal	OSU
Harrington, Henry G.	LHV
Hockett, Rowland R.	LHV
Hill, Thomas Russell	SLA; CU1
Hanisch, Arthur Oscar	SLA; PMT
Harvey, Harold W	WFO
Huntley, James W.	CGC
Hibben, Robert C	CGC
Higgins, Walter Jefferson	SLA; EOT
Hall, Theodore E	BST
Hopkins, Thomas, Jr	WFO
Hall, Norman S	TFT
Holden, Harlan W	HHN
Hayes, Martin J	BST
Hayes, Benjamin H.	TFT
Hutterly, Andrew J	LHV
Horton, Elwood	EOT
Hahn, Emanual	BST
Hamer, Edward B.	BST
Helstrom, Roy L	DMA
Hunter, Harold McKnight	SLA; TMA
Houghton, Frank C	EOT
Horine, Merrill C.	SAG
Hickman, Horace M.	DAF
Harris, Dale A	WFO
Hawley, Walter J	EOT
Hart, Joseph L	WFO
Hamlin, Charles E	WFO
Hill, Maurice B.	WFO
Henn, John E.	WFO
Harris, Dale A.	WFO
Halloran, Earl T.	TFT
Heyden, Arthur L.	TFT
Hall, Howard A	EOT
Harrell, Benjamin F.	WFO
Haldeman, George W	WFO
Hooker, Roger W.	BST
Horsley, Robert S.	WFO
Harvey, Harold M	SMM
Haseltine, Emery	WFO
Horst, John R	WFO
Hyden, Victor M	GLC
Hauck, Cornelius J	EOT
Haigh, Devereux Smith	SLA; GLC
Hanrahan, John Joseph	SLA; GLC
Howeth, Woodfin G	BST
Haight, Samuel	GLC
Hubbell, Harry L	BST
Hulbert, Lucius Gaylord	SLA; TFT
Hoyt, William King	SLA; KST
Hartt, Ohder R	CWT
Herr, Harry S	SLA; TFT
Huston, Sylvester	CGC
Haseltine, Emery	WFO

I

Illges, Abraham	LHV
Ivy, Fountain Turbiville	SLA; BST
Ives, Howard Caler	SLA; SMM
Israel, Gerald H	EOT
Irwin, John R	GLC
Ihrig, Howard K.	LHV

J

Johnson, Olin Samuel	SLA; TFT
Jenkins, Ned W	TFT
Jones, Vivian M	TFT
Johnson, Emil Raymond	SLA; LHV
Johnson, Charles C	HHN
Jones, James Elliott	SLA; SAG
Jenison, Austin	SLA; AAD
Jones, Edward Paul	SLA; ELA
Jaynes, John B	LHV
Jacobus, Charles R	FLA
Jarratt, Charles R	PWM
Jones, Charles E., Jr	TFT
Johnson, Joe D	PFO
Johnston, Joseph T	WFO
Johnson, Paul O	BST
Jackson, Roger W	WFO
Jones, Kenneth H	BST
Jackson, John W	EOT
Johnson, Raymond C	CGC
Johnson, Frederick Andrew	SLA; SAG
James, Edward D	WFO

K

Kilgore, Edward W	CAF
Kouns, Lewis Albert	SLA; RSD
Kitchen, Benjamin F	WFO
Kilcline, William Francis	SLA; EOT
Kinnard, Albert William	SLA; SAG
Kelly, Gerald Vincent	SLA; SAG
Karigan, Stephen E	ALF
Kann, Emil A	SLA; DIK
Klotz, Harry John	SLA; UIU
Kittinger, Charles Chase	SLA; RWT
Kratky, Alfred Henry	SLA; TFT
Kearney, John J	TFT
Killorin, George W., Jr	TFT
Kline, Lawrence Joseph	SLA; EOT
Kintzing, Edward O	LHV
Krause, James W	LHV; DAF; Note 1
Kennedy, Robert E.	BST
Kerr, William L.	EOT
Kalis, Samuel H.	PWM
Knight, Hebert G.	UTA
Keck, Ray Marvin	FLA; UTA
Kelleher, Melvin B.	HHN
Knopf, Lafayette	FLA; RWT
Keck, John H	CGC
Keith, Edward	CGC
Kraeckmann, Walter L.	EOT
Kern, Ralph Donald	SLA; EOT
Koch, John Frederic	SLA; TFT
Kennedy, James E	CGC
Kirkpatrick, Everett L.	LHV
Keightley, George M	GLC
King, Cloise A	CGC
Kinnard, Albert W	WFO
Kendrick, Aaron T.	DIK
Knott, James E., Jr	EOT
Kirby, Grady	CGC
Kelly, Roland D	EOT
Krieger, Robert Jacob	SLA; TFT

L

Lyon, William Lewis	SLA; KST
Laycock, Joseph Greenwood	SLA; CJW
Long, Leonard F	DAF
Lalley, Walter R.	WFO
LaPrade, Ernest M	DMA
Leeman, Franklin N	UCB
Lane, David Warren	SLA; EOT
Lyon, Edwin B., Jr	CAF
Loud, Lingard	SLA; ELA
Lestrade, Harold J	FRF
Lea, William Montgomery	SLA; ELA
Lemah, Edward Austin	SLA; RWT
Leenhouts, William John	SLA; PWM
Lloyd, William Folwell	DAP
Lawlor, William Charles	SLA; WDM
Lee, George F	DMA
Leonard, J. Cecil Leonard	DMA
Leonard, Leonard R	WFO
Lowell, Robert H. W	WFO
Leigh, Kenneth G.	WFO
Law, Sidney F	CWT
Lovrien, Ned Royal	SLA; TFT
Longinotti, James L.	CGC
Ladd, Arthur K	PFO
Latta, Franklin W	TFT
Lavene, Clayton C.	EOT
Lee, John F., Jr	TFT
Loucks, Edwin Earle	SLA; EOT
Lloyd, Milton D	BFT

M

Mahr, Ralph Edward	SLA; KST
Moore, William Stewart	SLA; SAG
Meredith, Clive Burlingame	SLA
Miller, Ernest Ludwig	SLA; RSD
Mallers, John B	WFO
Muncie, Floyd H	WFO
Moore, Walter F	FRF
Morrissey, Edward James	SLA; SBI
Meng, Paul Henry	SLA; RSD
Main, James Birss	SLA; LDT
Munson, Charles Counteil	FLA; WDM
Martin, Wells	SLA; DAP
Matthiessen, Frederick William	SLA; DAF
Mills, Thornton Anthony	MJA; VBW
Means, Gardiner G	EOT
Marrs, Aubrey R	EOT
Marlier, Raymond Murray	SLA; SAG
Martin, Leo C	HHN
Mitchell, Robert Lee	SLA; SAG
Miller, Walter	CAF
Moretti, Louis Ramon	SLA; RSD
Mills, Pittman Wall	SLA; BST
Marrs, Theodore C	TFT
Merrill, George R., Jr	CGC
Mills, Raymond T	CGC
Murray, Harry E	CGC
Moran, William K	WFO
Martin, William T	LHV
Moffatt, James	SLA; KST
Momeyer, Kenneth	DAP
Mayers, Howard Winfield	SLA; GLC
Mansfield, Edward Garrette	SLA; EOT
Manning, Robert	SLA; FOB
Mason, Hoelzle	SLA; GLC
Merriam, Robert Clizhe	SLA; RSD
Mayl, James Ellis	SLA; KST
Magovern, John Edward	SLA; EOT
Moore, Maurice H	LHV
Meyer, Frank W	WFO
Morse, Arnold Stetson	SLA; GLC
Mayfield, Mercer Brown	FLA
Martin, Dan Curtis	SLA; GLC
Mott, Louis C	EOT
Murray, Rudolph Charles	SLA; RSD
Mossbach, Robert E	EOT
Middleton, Ellis S	EOT
Murnen, George J	EOT
Monett, Howard B	BST
Marlier, Raymond M	WFO
Murphy, Fred M	CPA
Mooers, Clifford	PFO
Mitchell, Eliot W.	TFT
Marr, Kenneth	MJA
Murphy, Harry J	WFO
Morgan, John Ross	SLA; ELA
Miller, Arthur John	SLA; ELA
Mullen, Michael C	WFO
Miller, William A. C	MJA
Mills, Pittman W	WFO
Marks,. Allan D.	WFO
Moore, Joseph I	EOT
Miller, Royal M	CGC
Miller, Colin U	CWT
Moran, John A.	TFT
Murphy, Harry J	WFO
Moraga, Eugene Winslow	SLA; LDT
McDonald, Alexander Dee	FLA; VBW
MacDonald, John A	SBI
McKeena, Raymond Francis	SLA; TMA
McLeod, Jennings D	DMA
McKinstry, Augustus T	WFO
McCormack, Robert DeHuff	SLA; RSD
McLafferty, George Hoagland	SLA; FOB
McLaughlin, Edward Joseph, Jr.	SLA; SAG
McKnight, James A	LHV
McKee, George Paul	SLA; TFT
MacKay, Charles H	TFT
McRae, John	WFO
McArthur, Emmett K.	Note 7
McCoy, John F	Note 3
McCully, Coleman C.	GLC
McAneney, Earl R	PWM
McChesney, Frank William	CPA
McFetridge, John F	TMA
McDaniel, Marshall Alexander	SLA; EOT
McCormick, Alexander Little	SLA; GLC
McMahon, Michael J	Note 3
McDow, Cleo B	WFO
McGrath, John W	LHV
McCluer, Darius H.	TFT
McCaddam, Glen J	CWT
McBane, Frederick W	EOT
McElhinny, William D.	CGC
McVey, Richard K	GLC
McKinney, Norman	BST

N

Niven, Stanley	SLA; LDT
Northrup, Layton Louis	SLA; CUI
Nevin, William Boyd	SLA; LDT
Nunenmacher, Francis W.	TFT
Noel, Olen W	PWM
Nevin, William B	TFT
Norwood, John S	BST
Niday, Hugh D.	SAG
Neal, Guy O	PWM
Noland, Raymond R.	WFO

O

Ormsbee, Harry S.	SMM
Ollis, Luke Sullivan	SLA; SAG
O'Donnell, William Martin	FLA
Overstreet, Thomas J.	WFO
O'Brien, Bernard J.	WFO
Owen, Robert John	SLA; EOT
O'Sullivan, Daniel J	WFO
Owen, Richard L	WFO
Ogden, James R	WFO

P

Perry, Warren Dunning	SLA; RWT
Preston, Lewis B	MJA
Pelich, Joseph R	BFT
Pentland, Henry Bishop	SLA; KST
Parmented, Harley H	SLA; MAC
Pierce, William	MIT
Purdy, Donald F	PFO
Payson, John B	WFO
Price, Kenneth Gill	FLA
Pratt, Daniel H	LHV
Packard, Vernon Wing	SLA; GLC
Perry, Norman Adams	SLA; WDM; Note 19 Note 1
Parkhust, Amos J	Note 9
Peabody, George H	Note 3
Pletther, Walter E	EOT
Park, David Eugene	SLA; UTA
Pickels, George Wellington, Jr	FLA; UIU
Pye, Harvey N	DMA; EOT; Note 1
Parsons, Clyde Henry	SLA; EOT
Phillips, Walter P	DIK
Pinney, Kyle J	GLC
Pinckney, Francis Morris	SLA; AAD
Poleman, Thomas T	BST
Peterson, David McK	MJA
Price, Edward F	EOT
Putnam, Charles Francis	SLA; CJW
Peacock, Albert Bryon	SLA; SAG
Phinney, Barton V	PFO
Porter, Phillip W	PFO
Paschall, Ancil Earle	SLA; LDT
Phelan, Joseph P	CWT

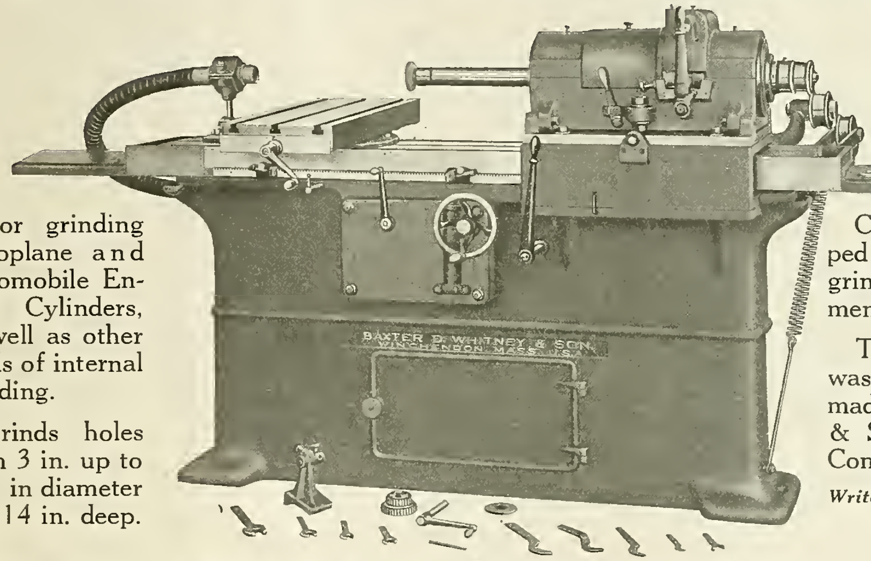
Q

Quirt, Harold William	SLA; EOT
Quirk, Joseph C	BST

R

Rountree, Leonidas Chestley	SLA; EOT
Richardson, Frederick S	SRC
Reid, Kenneth A	FRF
Robinson, Archbold Hamline	SLA; CUI
Roberts, Floyd Piercy	SLA; PFO
Real, Dennis Bernard	SLA; EOT
Runchey, John Edwin, Jr	SLA; SBI
Ryerson, Edward Larned	CPA; IMA
Regan, John A	EOT
Rubin, Myer Christella	SLA; RSD
Rhodes, Roy Stites	SLA; UCB
Randall, Rolph	SLA; UTA
Rowley, George I., Jr	DAP
Reese, Paul Jones	SLA; TMA
Reavis, Charles Frank	FLA; PMT
Ross, Malcolm H	LHV
Richards, Harrison H. C	GLC
Regan, Harold J	CWT
Ryerson, Edward L	MAC
Roberts, Kirk Madison	SLA; EOT
Roe, Joseph W	Note 2
Ruckstell, Glover E	Note 2

Cylinder Grinding Machine



For grinding Aeroplane and Automobile Engine Cylinders, as well as other kinds of internal grinding.

Grinds holes from 3 in. up to 7 in. in diameter and 14 in. deep.

Can be equipped with wet-grinding attachment if desired.

This machine was formerly made by Brown & Sharpe Mfg. Company.

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Ranney, Ambrose E.	Note 3
Read, Lemuel Wesley	SLA; GLC
Royce, Gardner	SLA; AAD
Ritter, Paul N.	FRF
Rodgers, Benjamin Gillespie	SLA; EOT
Rogers, Harry S.	BST
Raube, Reinhold H.	WFO
Reinhardt, Henry A.	WFO

S

Stinson, Karl Willson	SLA; OSU
Sbriver, Herschel Lasure	SLA; LDT
Sanguinet, Louis Conde	SLA; CRI
Stephens, Arthur J.	DMA
Sonday, Frederick John	SLA; EIA
Stonehraker, William Paul	SLA; CRI
Smith, Ralph Waldo	SLA; TFT
Smith, Clarence A.	SMM
Smith, William Arthur	FLA; UTA
Smith, Raymond D.	LTA
Smith, Herhert Worcester	SLA; LDT
Smith, Harold Carle	SLA; LDT
Smith, Thomas	SLA; KST
Sasnett, Bolling H.	BST
Skillman, William E.	BST
Saunders, Guy Durrel	SLA; TMA
Sasnett, Bolling Hall	SLA; TMA
Schmitt, Herhert Clarence	SLA; RWT
Salter, Dwight William	SLA; RWT
Stevenson, Francis L.	DAF
Stainton, Walter Hutchinson	SLA; CUT
Southee, Earl Raymond	SLA; CRI
Sanhorn, Thor W.	CPA
Schaf, Joseph C.	PFO
Strickland, David Light	SLA; CRI
Salmond, John	SLA; RSD
Snow, George William	SLA; BST
Stafford, Edward Emerson	SLA; GIC
Stenson, Irving Carlton	SLA; KST
Scherck, George	WFO
Sullivan, Edwin	CGC
Sanford, Frank W.	WFO
Schwartz, Edgar Louis	SLA; GLC
Singletary, Harry Hunter	SLA; EOT
Shaw, John S. C.	RSD
Suddard, Oliver	SLA; GLC
Smith, William Wallace	SLA; DAP
Simpson, John Aquinas	SLA; TMA
Smoot, William B.	DIS
Seeley, Ahe L.	TFT
Smith, Alexander D.	BST
Schultz, Raymond Howard	SLA; SBI
Shannon, Harold E.	BST
Skidmore, Andrew A.	CGC
Smith, Henry Roy, Jr.	SLA; TMA
Saal, Raymond H.	WFO
Stuhhlefield, Blaine	BST
Stauver, Frank L.	TFT
Slatterly, John W.	RSD
Stewart, Hal Wilson	SLA; RSD
Snyder, Jonathan L.	SMM
Strickland, David L.	CWT
Shepherd, Ridgely G.	WFO
Shield, Lansing P.	EOT
Smits, Larry A.	EOT
Seiler, Frederick E.	Note 3
Snowden, Charles N.	Note 3
Smith, William H.	LHV
Silverman, Silas P.	WFO
Sullivan, Daniel Joseph	SLA; RSD
Smith, James Roy	GLC
Stone, James Austin	FLA
Stephensón, George P.	DIK

T

Thomas, Gilbert Maxey	FLA; UCB
Taylor, Otto F.	DAP
Thorp, Cary Dean	SLA; BST
Thornton, Dudley Chipley	VBW
Thompson, Gough Winn	SLA; KST
Trowbridge, James O.	DMA; HHN; Note 1
Tidrow, Robert E.	KST
Twitchell, Roger Thayer	SLA; KST
Thorne, Henry S.	EOT
Thomas, Charles Edwin, Jr.	SLA; AAD
Thorne, William B.	WFO
Tresidder, Don	EOT
Tyssowski, Joseph G.	DMA
Terry, George F.	EOT
Tehh, Gordon E.	TFT
Titus, Charles V.	LHV
Tanner, Edward E.	Note 4
TenBroeck, Thomas V.	REL; Note 18

V

Von Eiff, Herman A.	FRF
Van Arsdale, Maurice W.	HHN
Van Zandt, Malcolm	PMT
Van Horsen, John M.	FLA
Voorhis, Clarence W.	WFO
Voshell, Howard	SLA; SBI
Van Horsen, John M.	DMA; Note 20; Note 1

W

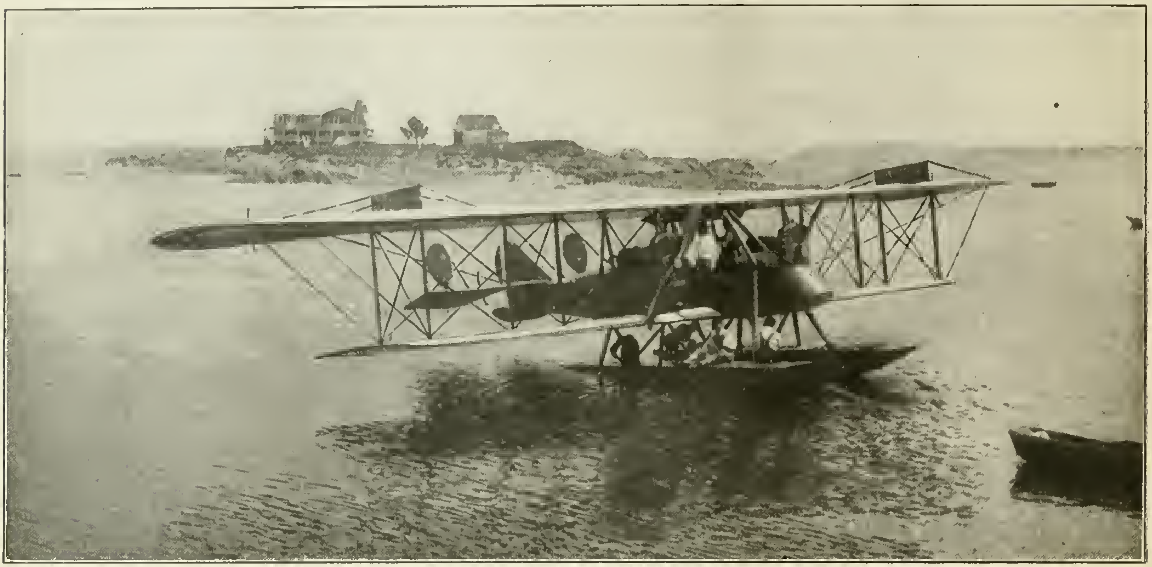
Weaver, Arthur B.	PUP
Walker, Phelps White	FLA; UTA
White, Robert Bruce	SLA; AAD
Watson, Henry L.	DMA
Wahle, Carl B.	BST
Ward, Leslie Clayton	FLA; VEW
Williams, Charles Baird	FLA; UTA
Williams, Elliott Tuttle	SLA; GLC
Williamson, Harlan A.	CWT
Wiedersum, Roy	SLA; ELA
Wilmeth, Roscoe Hall	SLA; UTA
Welty, James Alman	SLA; ELA
Wilcox, Roy Franklin	SLA; DAP
Waite, Allan G.	DMA
Weir, Matthews S.	PFO
White, William Joseph	SLA; RSD
Whitehurst, Frank Pearce	SLA; KST
Watson, Herhert Aborn	FLA; DAP
Wilson, Leroy Alonzo	FLA
Warfield, Gaither Postley	SLA; ELA
Wyman, Everett L.	DMA
Willis, Ned T.	SLA; EOT
Warren, George Stanley	SLA; GLC
Wright, Clifford A.	EOT
Windsor, Thomas H.	WFO
Wright, Earl L.	GLC
Waitemate, Louis F., Jr.	BST
Wilson, Benner M.	BST
Wilbur, Jerry F.	WFO
Woods, James A., Jr.	EOT
Woods, Robert J.	EOT
Wimer, Frank B.	EOT
Waterman, Herhert W.	EOT
Webb, Torrey H.	CAF
Wieport, George D.	BST
Wallace, George B.	PWM
Wellman, Arthur O.	WFO
Wilkinson, John S.	EOT
White, Julius A.	DMA
Wade, Andrew W.	PWM
Wine, Lyman A.	EOT
Wilson, Clarence C.	EOT
Wright, Robert D.	WFO
Ward, Charles P.	WFO
Woodhury, Phillip J.	WFO
Wirgman, Stewart L.	LHV
Williams, Isaac F.	CWT
White, Horace H.	WFO
Wells, Harold Raymond	FLA
Ward, Allen B.	BST
Worth, Paul	TFT
Woody, Kenyon	SLA; KST
Wright, Elisha P. S., Jr.	WFO
White, Walter L.	REL; Note 15
Welch, Clarence H.	Note 7
Walker, William S.	Note 14
Weeks, Alvin B.	REL; Note 6
Winnie, Irvin K.	Note 10
Wilcox, Philip W.	Note 2
Warner, Frederick H., Jr.	REL; Note 18

Y

Yager, Frank R.	GLC
Yeazel, Lloyd Homer	SLA; EOT; WDM Note 1
Yount, Barton K.	BST

Z

Zimmer, Elmer Edward	SLA; Note 12



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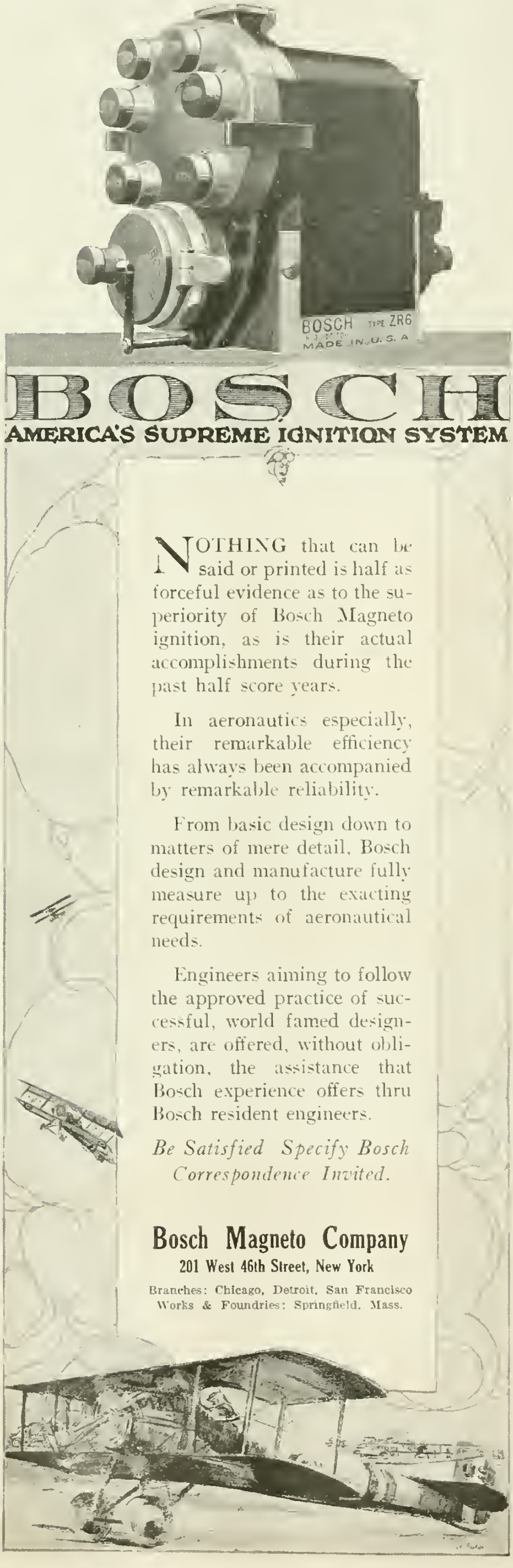

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(*Continued from page* 164)

and who is now in Paris, has volunteered to pay the expenses of establishing and maintaining a club in Paris for the Allied aviators during the period of the war, in the name of the Aero Club of America.

Mr. Beaumont was a resident of New York, before going to Paris in connection with Red Cross work. He is sixty-one years of age and a native of Dayton, Ohio.

Major Edmund Gros of the U. S. Air Service, who was one of the three founders of the Lafayette Flying Corps, and is a member of the Foreign Service Committee of the Aero Club of America, recently wrote to the Aero Club recommending the establishing of homes for tired aviators. His recommendation read, in part, as follows:

There is in my estimation, no way in which the Aero Club of America could render greater service to American aviators, and incidentally to the American Army, than by establishing one or more homes, where tired aviators could rest and find amusement and comfort.

The strain which active service brings to bear on the nervous system of a flying man is so great that few resist for very long without showing signs of breaking down.

The pilot himself feels this fatigue coming on, but as a rule will not give in until his symptoms become very marked. For instance in a case recently brought to my notice, one young fellow who had just been through several offensives, cried in a grocery store because the grocer told him he had no more sugar.

Examples are common where a pilot has been allowed to get in a state of extreme nerve exhaustion before leave was granted him.

It strikes me therefore, that there is a wonderful opportunity for the Aero Club to do good work, in a line which is not followed by other organizations.

Broken down pilots are first sent to a hospital where they are surrounded by illness and suffering. After this they are given a convalescent leave, and allowed to chose their place of rest. It is here that the difficulty begins. If they go to some country place, as likely as not, the food will be bad, the hotel expensive, and unless they meet friends, they will be bored.

If there was a home, run by fine broad-minded women, where there would be considerable liberty, gaiety and enjoyment, the aviator would quickly recover his morale and nervous equilibrium.

To obtain this, the life which he would lead here should be with considerable freedom of movement, Dances, Tennis, Swimming, etc., in a word, an active, home life.

In the case of the aviator whom I mentioned above, I sent him to a small watering place on the West coast of France, where I knew there were young people full of fun and ready to have a good time.

This Aero Club aviator's home would be destined for a special class of men, those who after strenuous work at the front have manifested unmistakable signs of nervous breakdown, whose efficiency is momentarily lost, and who, to be restored to usefulness, require a certain kind of moral nursing.

In accomplishing this task, one would not only be doing a humane thing to the finest specimens of our manhood, but would also contribute directly to the fighting force of our army by quickly returning to a state of efficiency, men who are momentarily useless as combatants.

This recommendation received the unanimous approval of the Foreign Service Committee, the membership of which includes; Ambassador, Wm. G. Sharp, Honorary Chairman; L. G. Bennett, President of the American Chamber of Commerce in Paris; Chairman; Sidney B. Veit, Honorary Secretary; John Weare, Treasurer; Robert W. Bliss; Wm. S. Hogan; Dr. A. L. Hipwell; Major E. L. Gros; Major Wm. Thaw; and G. F. Campbell-Wood and the Aero Club of American acted on their approval.

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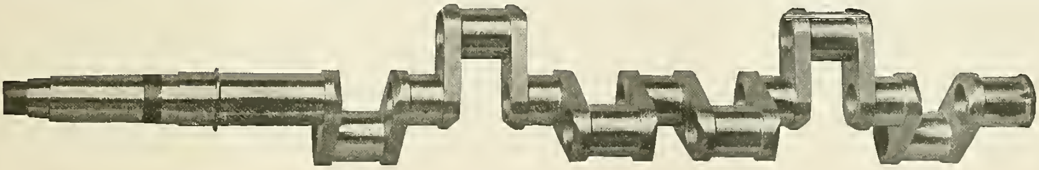

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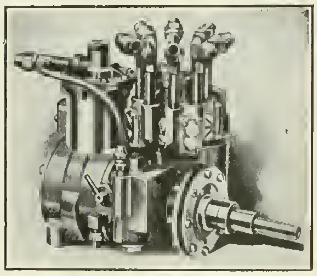

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engine with a new cylinder head (figs. 7 and 8), and also with new cams, including a camshaft reduction of 1:3. In the head is mounted a new transfer valve similar to the suction valve, which establishes the communication between the cylinder and the receiver. In order to avoid excessive valve spring tensions, the valve is provided with a balancing piston (fig. 9) on which acts the pressure of the receiver. The transfer valve is actuated by a cam (fig. 10) through a bell crank. Unfortunately, the position of the transfer valve on the opposite side of the camshaft necessitated an extraordinarily long and therefore heavy operating lever, the result being unfavorable inertia forces. The cam has two projections—the one opens the valve to transfer the air into the receiver, and the other to transfer it back into the cylinder. The double opening is also necessary with the suction valve, and accordingly this cam (fig. 11) has also two projections.

Fig. 12 shows a better solution of the problem. Suction and transfer valves are combined. The connection between the receiver and the outside air is governed by a concentric sleeve valve fitted above the mushroom valve in the cylinder head. This sleeve valve has only to assure air tightness against the receiver pressure (about 1.5 atm.) The mushroom valve is opened once only and remains open during the first four strokes. The sleeve valve establishes communication of the cylinder with the outside air and the receiver alternately. This design is in course of construction, and it is proposed to repeat the tests when completed.

During the tests the engine was coupled with a dynamo (figs. 13 and 14), the efficiency of which was previously determined accurately.

In all 100 tests have been carried out with different oils, at different loads, compressions, and different needle valves, while during small intervals (five to eight minutes) indicator diagrams (figs. 15 to 18) were taken with strong and weak springs. In order to determine the heat carried away by the cooling water, the amount of water and its temperatures at the inlet and outlet was measured.

The heat carried away by the exhaust gases was also measured. This was effected with a water-cooled silencer and calorimeter illustrated in figs. 19 and 20. The amount of water had been weighed separately, and the temperatures of the water registered at the inlet and outlet. The flow of water to the calorimeter was so regulated that the exhaust gases reached approximately the surrounding temperature.

Table II. gives the results of one series of the tests. During this particular series Galician crude petroleum was employed, the higher calorific value of which was 10,395 and the lower calorific value was 9,795 Th.U./kg. The consumption figures have been converted to the mean calorific value of 10,000 Th.U./kg.

The consumption was good at all loads. With such an overload as to bring the total output to about 47 h.p. the exhaust became somewhat impure. The load could be brought up to 53 h.p., however, with a smoking exhaust. This load can therefore be considered only permissible temporarily.

The simple plate diffuser was not adequately dimensioned to cope with the double amount of oil necessary for each charge. Experience in this direction was lacking to obviate the defect, and for this reason the fuel consumption was adversely affected. There is, however, no reason why the combustion could not be effected just as completely as in the four or two-stroke cycle engine.

In the heat balance the upper calorific value has to be taken, because the exhaust gases are cooled down to almost the surrounding temperatures, and it will be seen that the sum of the measured heat quantities (indicated power plus exhaust gas plus cooling water heat) is smaller than the calorific value of the oil consumed.

TABLLE II.
(280.— 440 MM. BORE AND STROKE.)

		I.	II.	III.	IV.
Duration of test	Min.	62.5	50	47	52
Revolutions per sec.		207.75	208.0	207.0	209.0
Electric output on switchboard	V.	189.20	182.50	189.20	197.10
	A.	130.00	147.20	153.60	80.68
Efficiency of dynamo	%	89.70	89.50	89.50	91.00
Effective output of engine	H.P.e	37.26	40.78	44.12	23.74
Pressure of air blast	Atm.	95.0	97.0	98.0	91.5
Mean indicated pressures—(*a*) Without subtracting negative work	Kg./cm.^{2}	13.93	14.20	15.38	9.41
(*b*) With " "	"	12.80	13.07	14.25	8.28
Indicated positive output	H.P.i	58.08	59.28	63.89	39.47
Indicated remaining output	H.P.i	53.37	54.56	59.20	34.73
Mechanical efficiency—(*a*) Without subtracting negative work	%	64.14	68.80	69.05	60.16
(*b*) With " "	%	69.81	74.75	74.53	68.34
Oil consumption— (*a*) Without subtracting negative work	Kg./h.p.i-hour.	0.145	0.165	0.181	0.163
(*b*) with " "	"	0.158	0.179	0.195	0.186
Idem	Kg./h.p.e.-hour	0.226	0.240	0.262	0.271
Exhaust—gas temperature at outlet from calorimeter	C°	32.5	31.8	35.6	22.0
Heat value of fuel consumed per hour (calculated with low heat value)	Th.U./hour.	84490	97950	115800	64580
Heat value of the indicated output per hour	"	36938	37700	40636	25126
Heat absorbed by the cooling water	"	25400	29600	29100	19800
Heat carried away by the exhaust gas	"	19350	23800	25500	16800

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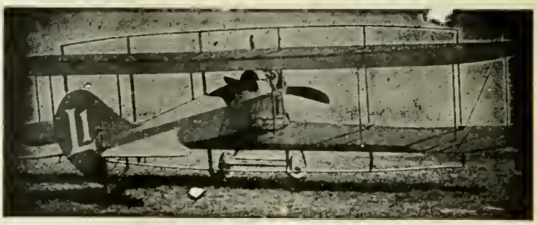

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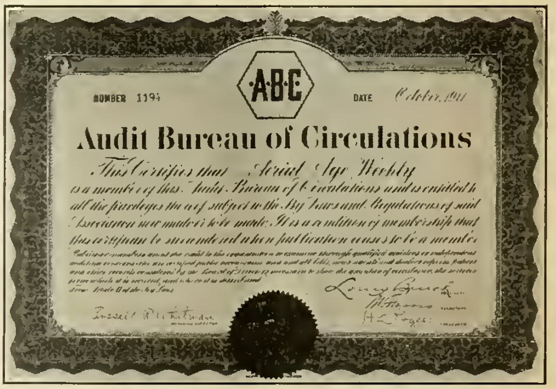

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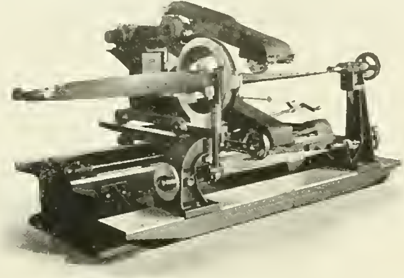

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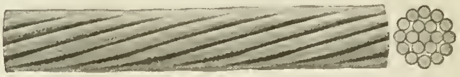

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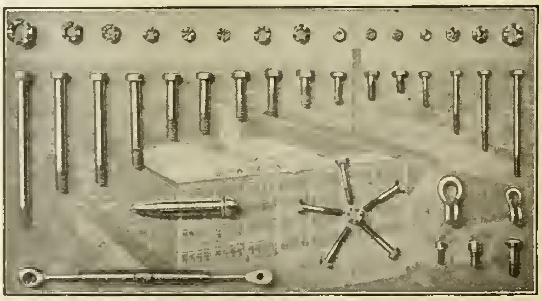

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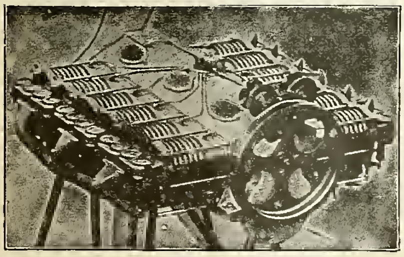

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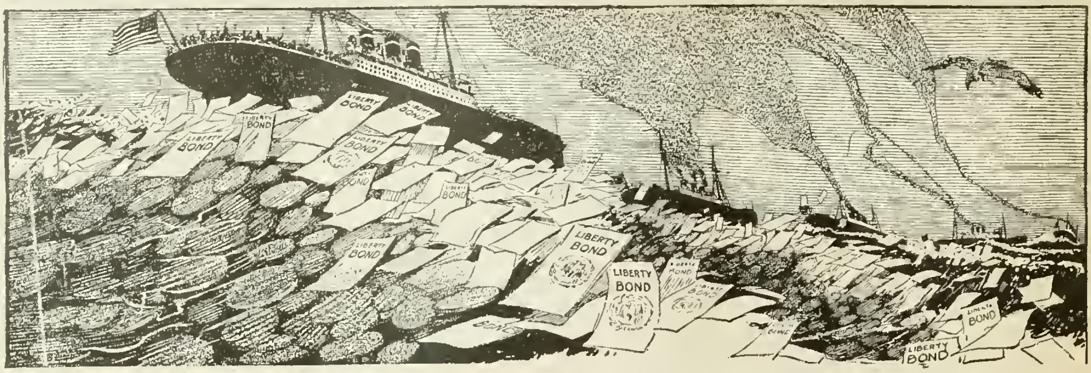

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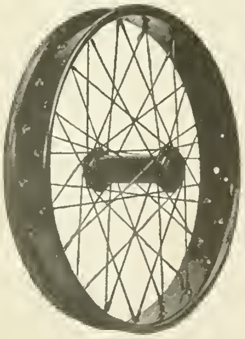

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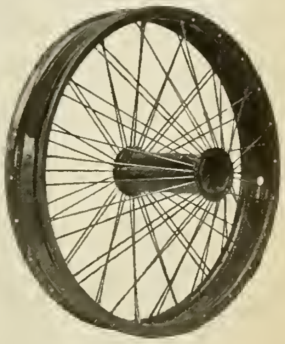

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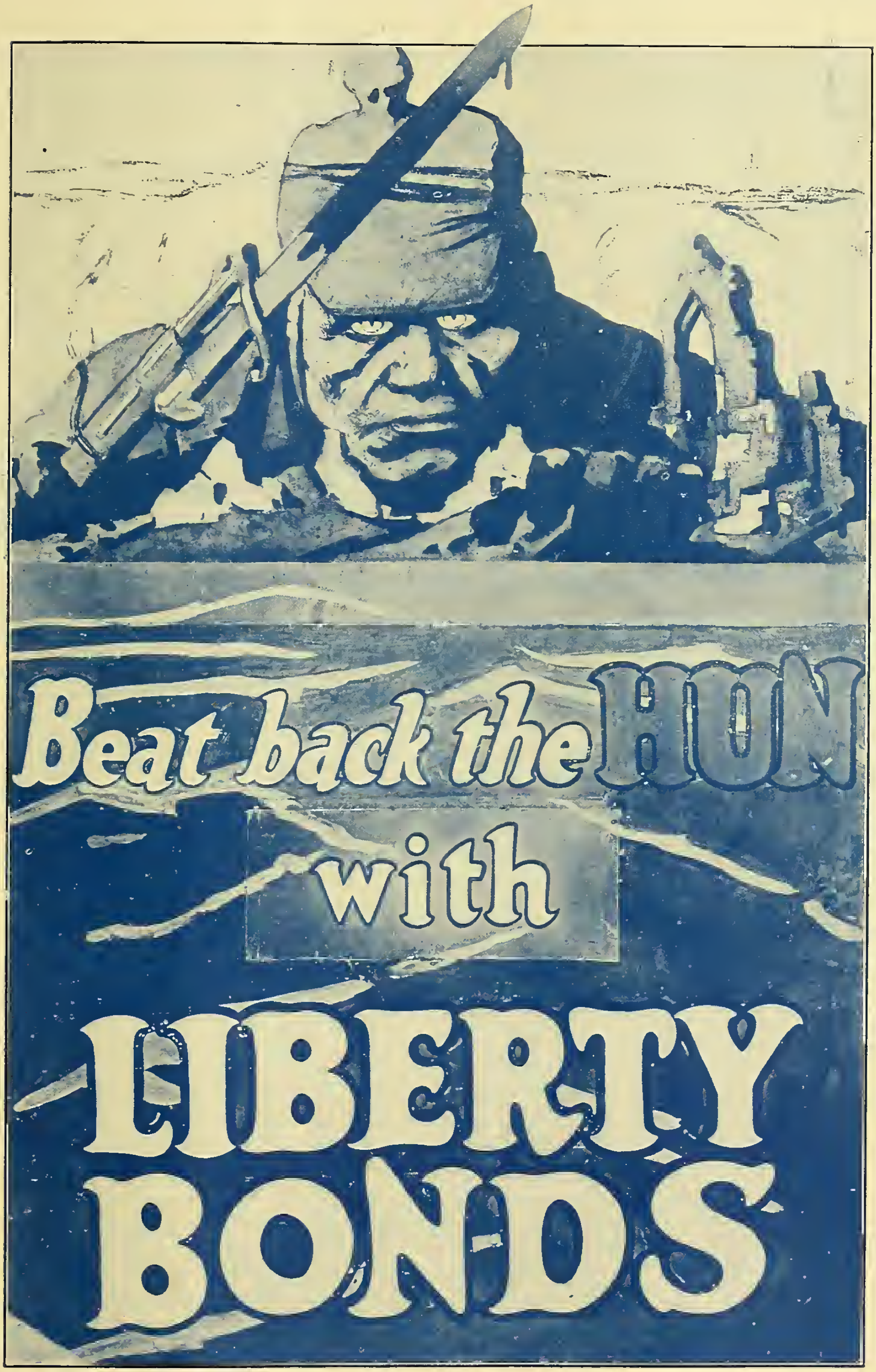

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AERIAL AGE WEEKLY

Vol. 8, No. 5 OCTOBER 14, 1918 10 CENTS A COPY

GERMAN PRISONERS BEING SENT BACK OF THE LINES
German prisoners passing a British anti-aircraft battery on their way back to the "cages"

Germany's Peace Offensive Against the Fourth Liberty Loan

World's Altitude Record Broken by American

PUBLISHED WEEKLY BY THE AERIAL AGE CO., INC.
Foster Bldg., Madison Ave. and
Fortieth Street, New York City.
Subscription: Domestic, $4; Foreign, $6.
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OAKLAND, CALIFORNIA

TEAM-WORK

Today every American has his position to fill and his work to do—with his duty clear

By J. HORACE LYTLE

No force on earth can defeat a sublime, popular patriotism—if backed by perfect Team-Work.

Team-Work is, and ever has been, the keynote of all success.

Let us illustrate in terms of the game. A team must play together—one man for the other—every play for the good of the team, as a whole, not the glory of any one player. This is true whether it be in football or business, baseball or WAR.

And such team-work wins games. Just as it also wins battles—and WARS.

The War is the greatest game we are playing today. It is the business of the hour. It is our business to win. WE ARE WINNING.

And it is the Team-Work, as well as the spirit, of America and her Allies that is doing it. America has a great team in the field. On this team are the soldiers, sailors, statesmen, workers, doctors, nurses, bankers, merchants, manufacturers—all working for the good of the whole.

On our team, in the trenches, we have poor boys, rich boys, farmer boys, colored boys—all fighting together side by side, advancing, falling, bleeding—and even so dying, side by side. It is the most perfect tribute the world has ever paid to the democratic principle.

And it is the most superb Team-Work.

Those wonderful, those glorious boys in France are to our great war team what the back-field men are to a football team. They are carrying the ball. All praise to them—and let all the glory that can come be theirs!

But, let us in justice also remember, those lads in France could not go far if it were not for the part that others are playing behind the lines. Even though our work may not be so spectacular, let us do our duty. Doing our duty means—well, we all know what it means if we stop to think.

Right now it means *BUY BONDS* of the Fourth Liberty Loan.

Buy *MORE* Bonds! Do it before Oct. 19th.

And, by so doing, we will perfect the Team-Work behind the boys at the front with a strength that no force on earth can stop—and we will shorten the road for those lads in France on their march to Berlin.

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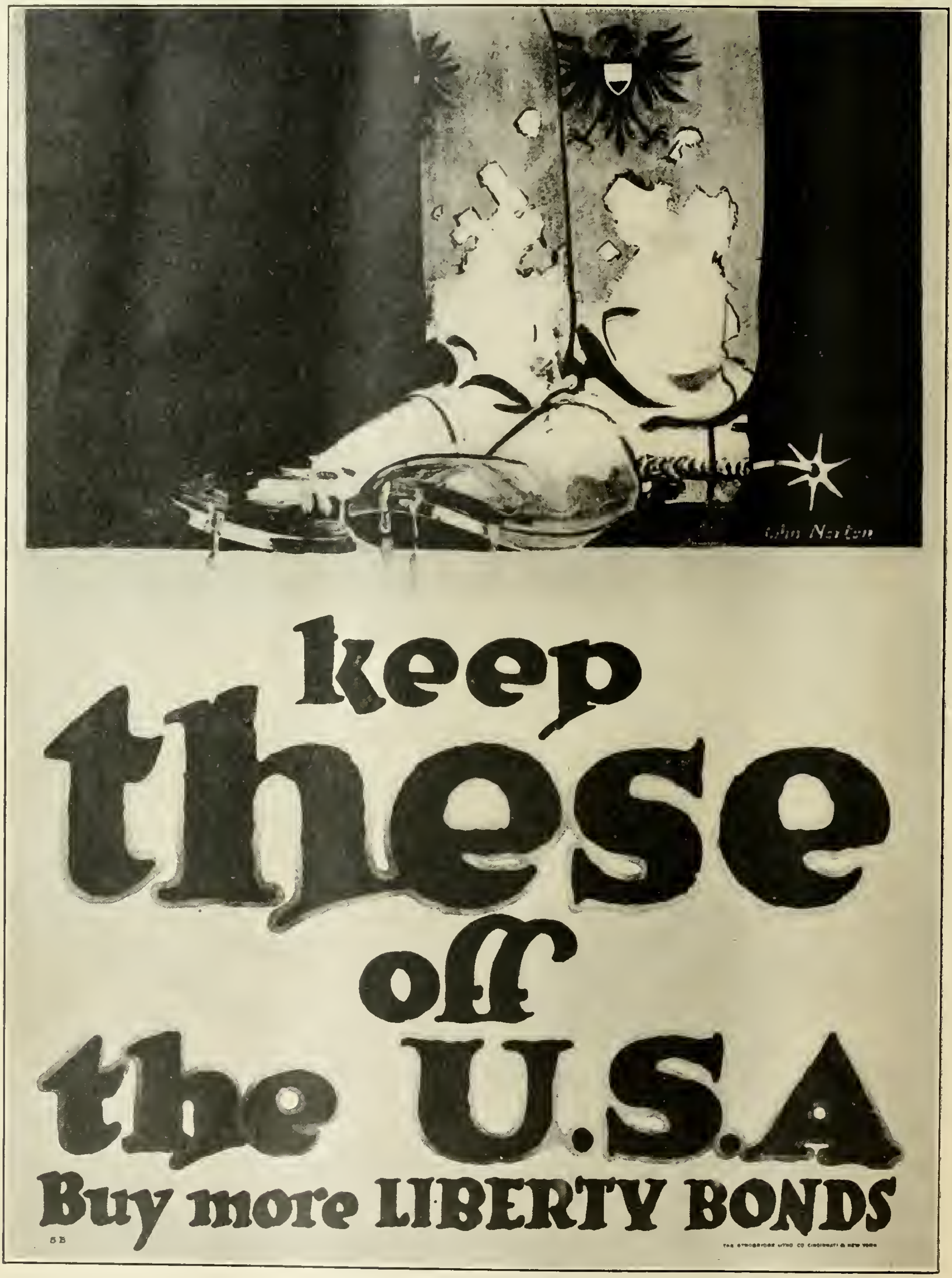

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Grand Finale (Battle Formations)

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AERIAL AGE WEEKLY

Vol. VIII OCTOBER 14, 1918 No. 5

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Uncle Sam, We Are Here!

WHEN Uncle Sam finally saw the importance of striking Germany through the air, in the Summer of 1917, and he wanted to place orders for about 25,000 aeroplanes, 40,000 motors, and the necessary equipment to build a real Air Service, he looked around and found a very meager aeronautic industry—meager because there had never been enough business on which to develop.

Then Uncle Sam called on the other industries for help and their answer was like General Pershing's answer when he landed in France. General Pershing said: "Lafayette, we are coming." The industries said: "Uncle Sam, we are coming."

On July 14th, 1918, General Pershing went to Lafayette's grave and said simply "Lafayette, we are here!" Only four words, but much more eloquent than a book.

Now that American battleplanes equipped with Liberty and Hispano Suiza Engines are actually helping the Allies' Advance, and, as the War Department announces, 6,600 training planes and 12,500 training engines have been produced, the Aeronautic Industry can say: "Uncle Sam, we are here!"

Believing that there is no better way of carrying this idea "across" than to paraphrase General Pershing's statements, as above, AERIAL AGE will issue a special number on October 21st, to be called the **"Uncle Sam, we are here"** Number.

In this number we will give a review of the status of the Aeronautic Industry and of the splendid outlook for quantity production. This number carries out the policy of President Wilson to do everything possible to cheer up our Allies and cast gloom in Germany, by showing that Uncle Sam is in this fight to win and that he is getting into a state of production and will soon be in a position to strike with both fists as well as with both feet.

Your firm is one of those who can say: "Uncle Sam, we are here."

Put the punch behind your advertising copy, and have it in our hands not later than October 15th, and we will do the rest.

G. DOUGLAS WARDROP,
Managing Editor,
AERIAL AGE WEEKLY,
280 Madison Avenue, New York.

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VOL. VIII NEW YORK, OCTOBER 14, 1918 NO. 5

IS GERMANY'S DEMAND FOR PEACE A TRICK TO DEFEAT THE FOURTH LIBERTY LOAN AND CAUSE U. S. TO STOP SENDING SOLDIERS OVERSEAS?

THIS is the question we must ask ourselves—and we must not relax an instant from the work of producing war materials.

Let there be no pause in the production of aircraft. Today's (October 6) despatches in telling of the attacks of German aviators on American troops on the Argonne front say:

"Our pursuit squadron tonight sought out the foe beyond the Kriemhild line and over our own lines as well, but still his airmen, singly and in groups, skimmed above our troops, sometimes at a recklessly low altitude."

We are dealing with a deceitful, resourceful enemy, let us beware.

Germany felt certain that our tonnage would never permit our sending overseas half a million men and she was not afraid of that number. She felt certain that we could not convoy our ships and that the output of aircraft, submarines, and artillery would be negligible. It did not occur to Germany that England would be in a position to transport one million Americans to France and to do seven-tenths of the convoying of troopships, protecting them against U-boat attacks.

If Germany could defeat the Fourth Liberty Loan and stop or retard the sending over of more soldiers and equipment or cause the United States to pause in its work of producing war material, she could then prepare throughout the winter months, so as to be ready next spring for a new offensive.

But the nation with one voice has answered the Germans as they should be answered and as President Wilson answered Austria recently.

Following are quotations from the leading newspapers throughout the country:

NEW YORK

No Peace with the Hohenzollern

From the New York *Times*

If Germany wants peace, let her do away with her irresponsible, braggart Kaiser and speak by a Government of her own people to the Governments of the allied peoples. It is not from Prince Maximilian, answerable only to imperial authority, but from a minister responsible to the German people that Germany's plea for peace must come.

President Wilson can be trusted to make an answer to these overtures which will leave no doubt as to the determination of Germany's foes to pursue their victories until she can fight no more, until surrender is forced upon her, and with it security against any further disturbances of the peace from that quarter.

"Autocracy Knows It Is Whipped"

From the New York *World*

It has taken the Imperial German Government more than four years to learn that it is easier to begin a war than to end it. When it staged the conflict such a thing as defeat was not considered. Now it finds its armies overmastered, its subjects at home sullen or revolutionary, its allies beaten or disheartened, and the vast delusion that it could not be conquered everlastingly shattered. To save what it can from the wreck, to preserve the dynasty, to restore as far as possible the lost prestige of militarism and to prepare for another day—what further motive can have inspired it and its Austrian vassal in renewing so soon and in phrases so little changed a proposal for a negotiated peace?

The answer to this question, we believe, is that autocracy is whipped and knows it is whipped, and that presently it will be compelled to acknowledge the fact.

Still "Force to the Utmost"

From the New York *Tribune*

They address their overtures to us, pretending to accept in principle the conditions of peace laid down by President Wilson. But they are wrong. We are not the peace makers. We are the war makers. It is true that we have laid down certain abstract conditions of peace, but these concern only our allies and ourselves exclusively, and are not open to Germany for discussion.

We have laid down one condition of war—one only—and that is to use force, force to the utmost, force without stint or limit, until we shall have destroyed forever in this world the indecent, intolerable, criminal thing that now holds out its dripping hand.

Acknowledgment of Defeat

From the New York *Herald*

It is Foch and Pershing and Haig and Diaz and d'Esperey and the valiant men of their commands, and the people back home who are giving them such splendid support, who are making for peace—the right sort of peace—but unconsciously Prince Maximilian and Baron Burian may be helping. The Hun is cracking. In these desperate appeals for peace will not the men at the front see an acknowledgment of defeat by the Governments upon which they have pinned their faith and whose word they have accepted with blind faith in their omnipotence? . . .

There will be no armistice. There will be no negotiations until Germany prefaces its plea with unconditional surrender. We have just begun to fight!

ALBANY, N. Y.

"Strikes Us as Only Funny"

From the *Knickerbocker Press*

Talk of peace from the Kaiser is momentous news. But except as news it is of no importance. We do not want to talk to the Kaiser. From him we want one thing first, unconditional surrender, and what happens afterward we will decide for ourselves. The Kaiser will not be there. His futile scurrying around to save his skin strikes us as only funny. Let him give up his arms and his armies and get back into Germany where he belongs, joining restitution to penitence, and guaranteeing both by a humility that cannot be questioned, and thereafter there may be a peace conference, but it will not be one with a German present.

BOSTON

Beware of Empty Talk

From *The Herald*

The Austro-German proposals for an armistice can have no success. An armistice would be of great military advantage to Germany, Austria-Hungary, and Turkey, enabling them to rest and reorganize their armies and construct new means of offense and defense. Not for one day, not for one hour, nor for one instant should continued occupation of the invaded territories be permitted by the Powers, whose very first purpose is to free them from the invaders. Then let us beware of calling a halt to listen to empty talk which is intended to flatter and dupe. The proper course was taken with Bulgaria. Unconditional surrender is the door to real peace negotiations.

Question of Germany's Fitness

From the Boston *Globe*

Revelations may occur overnight. Revolutions do not. And it will take more than Prince Maximilian's belief that Germany is now fit for decent nations to associate with, or to do anything but war against, to make her so. For it is not the kind of peace we make with Germany that matters so much as the kind of Germany with which we make peace.

Merely Ask for Armistice

From the Boston *Post*

It is impossible to regard this plea for an armistice as anything but a species of trickery either to gain military time, with armies hard pressed by the master genius, or to get around a peace table holding the better cards for the game. In fact, they do not ask for peace; they do not sue; they merely ask for a cessation of hostilities in order "to start without delay negotiations for peace"—and the world knows what such a proceeding would mean to the unscrupulous scoundrels who would, as things are today, speak for Germany in such a council. Armistice? A thousand times no.

BUFFALO

Must Be No Armistice

From the Buffalo *Express*

The *Express* regards the proposal as a "Kamerad" cry and thinks it evidence that the German army is beaten on the present front. There must be no armistice during which Germany could extricate her army and reorganize it on the short front of the German border, thereby prolonging the war two or three years. . . . If they want peace, let them seek it in the manner that Bulgaria did.

Same Deceptive Game

From the Buffalo *Courier*

The latest output of peace talk from Berlin is merely a part of the same deceptive game, under the guise of a new Chancellor with a curiosity-exciting advertisement of a new policy of moderation and concession, a policy of come into the spider's parlor and talk it over. No, the people of the United States have their eyes fixed steadfastly upon the battlefields, where they expect to see the winning of the victory that will enable the winners to dictate the terms of peace. Smash on, smash on!

PROVIDENCE, R. I.

Enemy Is Facing Justice

From the Providence *Journal*

It seems incredible that Germany should believe that her mouthings about the rights of nations are going to bring the Allies to kiss her bloodstained hands at the moment when she is facing the justice which comes sooner or later to those who violate the laws of God and man.

PHILADELPHIA

German Perfidy Known

From the Philadelphia *Public Ledger*

There is no occasion for the Allies to answer in detail the peace offer of the new German Chancellor. The Kaiser himself has answered it. His proclamation to the army and navy is in the old arrogant vein. "The Macedonian front has crumbled. Our front has not been broken and it will not be." The retreat in Belgium and France leaves him still boastful and unrepentant. If he foresees the end he will not admit it. He is still to dictate conditions. "It will be only an honorable peace for which we extend our hand." What is honor to him and his Government? We have learned from bitter experience the perfidy of both.

Why Negotiate?

From the Philadelphia *Record*

If the Central Powers are ready to stop fighting, let them stop and ask the Allies for terms. If they are not yet ready for that, they had better keep still and go on with their fighting. . . . Why should the Allies negotiate with them? They have plenty of men and plenty of money and munitions to carry on until the Central Powers make an unconditional surrender.

PITTSBURGH

Russia's Fate a Warning

From the Pittsburgh *Dispatch*

The German high command showed in its dealings with Russia that it has no more respect for an armistice than for a treaty. It cannot be trusted either in peace or war. Therefore, no armistice until the Germans are back in Germany. Prince Maximilian's peace offer is the same old trick in a new guise. Anything for an armistice that will save the German military situation and for negotiation that will befog the issue.

CLEVELAND

Utter Surrender Only

From the Cleveland *Plain Dealer*

There is but one possible termination to the war. The fighters will never pause until Potsdam is beaten down into the dust, until the Germany that seeks terms is a non-Potsdam Germany. Germany can have the peace that has come to Bulgaria. She can have the peace of utter surrender, the peace that is based on safe assurance of future decency. Other peace for Germany there can never be.

DETROIT

Example Set by Bulgaria

From the Detroit *Free Press*

The utterances of the President of the United States and of the Entente statesmen give us guarantee that the position taken toward Bulgaria when the Sofia Government asked for an armistice provides a forecast of the position the Entente will take toward Bulgaria's erstwhile ally and master. Don't relax. Don't quit until President Wilson announces that victory is ours.

TROY, N. Y.

No Dealings with Hohenzollerns

From the Troy *Record*

The Hohenzollern Noah has sent another dove from the ark with an olive branch in its mouth. It is a pretty ritual and can do no harm to the cause of freedom. For the Allies will have no dealings with the Hohenzollerns on Prince Max's terms or any others. When Germany itself offers unconditional surrender, talk of an armistice will be tolerable.

ST. LOUIS

Peace Talk Useless Now

From the *Globe-Democrat*

It is useless for the Central Powers to talk of peace when their talons clutch the land which they have grasped and while they hold the people of the countries they have overrun in enslavement. Ending the war is a mere incident in the achievement of the great purpose which has become the fundamental issue of the struggle.

Must Follow Bulgaria's Example

From the *Republic*

Austria has already been told that before its invitation to a peace conference is accepted the conditions already laid down by the Allies must be agreed to, not merely as a basis of discussion, but a basis of agrement. Austria can have an armistice if she agrees to terms similar to those agreed to by Bulgaria.

LOUISVILLE, KY.

America Has But One Answer

From the Louisville *Courier-Journal*

Whether the time for the peace conference is now or later, whether the reports are part of the giant propaganda styled "The Kaiser's Peace Drive," or whether they are the result of the downfall of the military colossus of Europe, the people of America have but one answer: Unconditional surrender. Military autocracy and its ambitions must be felled forever. The long line of allied fighting men from the North Sea to Colmar, moving in a trail of priceless blood toward the Rhine, will not find their home nations making terms behind them.

SAVANNAH, GA.

Must Lay Down Their Arms

From the Savannah *Morning News*

It seems to the *Morning News* that the answer of the President of the United States to this "offer" of peace should be that the United States cannot treat with the Kaiser. The German armies must lay down their arms before peace talk begins. The democratic world has the chance now to rid itself of Hohenzollernism. If this generation does not seize this opportunity it will deserve the condemnation of posterity. Let there be no "next war." Let's finish the business this time.

(*Continued on page* 235)

THE NEWS OF THE WEEK

To Berlin Via Airline

(*Written exclusively for* Aerial Age Weekly.)

The aeroplane typifies this war just as the phalanx typified the wars of Alexander the Great. This war has become a war in the air. Both sides are fighting for the supremacy of the skies, and America intends to help win it for the Allies. For that reason the United States is building thousands of aeroplanes. More than we possess will be needed to carry the war into Germany.

It takes vast sums of money to build aeroplanes in quantities sufficient to make sure of the sky battle. It also takes money for ships to combat the menace of the submarine—and money for our guns and all that land warfare necessitates in order to crush German militarism.

This money the United States *Government proposes to raise* by the Fourth Liberty Loan Campaign for *six billions of dollars.* The success of the campaign rests on the understanding of the people that this money is to be devoted solely to the nations' solemn purpose of liberating the world from the threat of German militarism.

The war has taken the aeroplane out of the experimental stage and made it a practical instrument of warfare and a useful means of transportation in times of peace.

We must have a never-ending procession of aeroplanes, an aerial Brooklyn Bridge, from America to Berlin. There must be aeroplanes tearing across the sky, winging their way over the sea into Germany, with Berlin as their journey's end.

So lend the Government your money—with Liberty Bonds as your security with interest—that sufficient quantities of aeroplanes may be built to crush Teuton vandalism and liberate the world from the threat of German militarism.

Flew from Aberdeen, Md., to New York

Lieut. E. M. Ronne, U. S. A. S., and Lieut. C. H. Roberts, U. S. A. S., recently flew from the Aberdeen proving grounds, Maryland, to New York City, a distance of about 185 miles, in two hours and fifteen minutes. On October fourth Lieut. Roberts and Ensign Davis, U. S. N., flew back to Aberdeen.

Need Mechanics for Air Service

Trade Test Board No. 2 has sent out the following statement: "The Government is now calling for skilled mechanics between the ages of eighteen and forty-six in the following trades. Motor mechanics, instrument repairers, coppersmiths, carpenters, ignition repair men, propeller makers, blacksmiths, cabinet makers, fabric workers. Mechanics wishing to answer the call and enter the United States air service may apply to Lieut. Billker, ninth floor of 104 Broad Street, any day except Sunday, between the hours of 8:30 in the morning and 5 o'clock in the afternoon."

Kaiser Hid in Cellar During Mannheim Raid

Geneva.—Emperor William, Field Marshal Duke Albrecht of Wurttemberg, and Prince Stephen of Schaumburg-Lippe were in Mannheim when British airmen raided the city.

The royal party, according to the *Democrate* of Geneva, was staying in the Royal Palace and the Emperor and his staff promptly took refuge in the cellar, remaining there twenty minutes. The palace was not hit, as it had been in a previous raid, but bombs fell in the vicinity.

France Honors U. S. Airman

Paris.—Lieut. W. Vernon Booth, Jr., of the American Flying Corps, was cited in the *Journal Officiel* on September 29 as a pilot of splendid courage. The citation says:

Seriously wounded during a fight with four enemy planes and his own plane on fire, he had the presence of mind, despite severe burns, to extinguish the fire and land between the lines, forty yards from the enemy trenches. He regained the French line through a heavy gun and machine gun fire.

Lieut. Booth died in a Scottish hospital near the fighting front early in July from injuries sustained in an aerial combat over the German lines. The injuries necessitated the amputation of a leg. In Paris last April, Lieut. Booth married Miss Ethel Forgan, daughter of a Chicago financier.

Benefit for Air Corps

White Sulphur Springs, W. Va.—Seven hundred dollars was raised on September 28 for the athletic and musical equipment fund of the National Aeronautic Committee, when official films were shown by Augustus Post, secretary of the Aero Club of America. Lieut. Reid Benham gave a short address. Mrs. Edward W. McKenna, chairman of the entertainment committee for the association, was in charge, assisted by Ethel Barrymore, Miss Josephine H. McClure, Mrs. David Stevenson and Mrs. J. Howard Slocum.

LIEUTENANT FRANK LUKE, JR., DESTROYS THREE GERMAN BALLOONS IN THIRTY-FIVE MINUTES

The photo shows Lieutenant F. Luke, Jr., who at dusk on the 17th of last month brought down three enemy balloons in the surprisingly short time of thirty-five minutes. Luke comes from Phoenix, Ariz., and he has done some wonderful work as a "bird man". These additional three bring his total for three days up to eleven. Eleven enemy balloons in three days! Lieutenant Luke has decidedly brought honor to his native city by his accomplishment in his air fighting on the Lorraine front overseas

Germany Drops Its Plan to Punish Our Aviators

With the American Army in France.—A captured document says that the German decision regarding the courtmartialing of American aviators caught dropping propaganda pamphlets has been rescinded and that in the future only aviators having propaganda in their possession will be dealt with as "special cases."

Lieut. Luke "Hates" Balloons

Lieut. F. Luke, of Phoenix, Ariz., fattened his record of enemy balloon destruction by shooting down two additional balloons, making a total of eleven in four days. In addition he brought down two aeroplanes in that period.

One of the Lieutenant's victories over an enemy plane was confirmed by himself. He landed by the side of the fallen machine to make sure that its occupants did not escape and turned them over to the French. He then returned to his squadron with the confirmation papers in his pocket.

All of the eleven balloons were accounted for by means of incendiary bullets. The majority of the attacks on the balloons were made at the greatest personal risk to the flier because he was the objective of quantities of the type of anti-aircraft projectiles called "flaming onions," which set an aeroplane ablaze if they hit it accurately and which must be nimbly dodged in the air.

On the flight during which Lieut. Luke brought down three enemy balloons and an aeroplane, his gasoline became exhausted and he was forced to depend upon the small emergency tank. Lieut. Luke turned on this supply, sufficient only for ten minutes, and though on the German side of the lines he went after his two opponents in Fokker machines.

Hughes Resumes Hearings

Washington.—Hearings in the Department of Justice aeroplane investigation have been resumed after a recess of several weeks devoted to transcribing records of testimony.

Army officials, civil officials and representatives of aeroplane manufacturing concerns are to be heard here by Charles E. Hughes and Attorney General Gregory, and these officials expect to begin next week the task of compiling the final report. This probably will be completed and sent to President Wilson in about three weeks.

Prince Demands War Role

London.—The Prince of Wales has figured in many stories which concern his insistence on having a real part in the war, regardless of the danger to himself.

The Prince recently appeared on the Italian front and explained to the commanding officer of a British flying squadron that he had obtained permission from his father to accompany one of the fighting pilots over the Austrian lines.

One of the crack British airmen was just leaving on a strafing mission and reluctantly yielded to orders for the Prince to accompany him. The machine flew very low, using machine guns on the Austrians, to the great satisfaction of the Prince.

Must Fly in Planes They Declare O. K.

Washington.—Government inspectors of aeroplanes and engines who pronounce machines safe and ready for flight will be required henceforth to accompany the pilot on the initial test in the air. Likewise mechanics repairing aircraft will accompany pilots on first flights after the work is pronounced done. The idea, according to W. C. Potter, acting director of aircraft production, is to give the inspectors and mechanics "a proper appreciation of their responsibility."

"I know no better way of impressing upon these men the importance of their work," said Mr. Potter, "than by giving them a first hand demonstration of the very great stresses and strains put upon aeroplanes and engines."

D'Annunzio in New Flight

Rome.—Gabriele d'Annunzio, the Italian author-aviator, who on September 26 flew from Turin to Chalons, behind the French front, a distance of about 290 miles, made a return flight from the French front to Milan in three hours and ten minutes.

Aeroplane's Last Tribute

Hempstead, L. I.—While thirty-six aeroplanes hovered overhead dropping flowers, the body of Major Whitten J. East, commander of Mitchel Aviation Field, who was killed on October 2 in an automobile accident near Hazelhurst Field, was taken to the railroad station for transportation to the home of his parents in Sanatobia, Miss. A military escort went with the body. Just before the flyers took to the air, Major East's machine, "The Fighting Cock," was wheeled out to the starting line on Mitchel Field. It was draped in black and there was a wreath of roses on the propeller. One by one the "ships" ascended until "The Fighting Cock" stood alone on the wide field.

Downed 4 Times, U. S. Flyer Kept On

Shot down four times in a day, an American aviator named Allen, from California, landed safely each time and ended his day's work by capturing a squad of Germans single handed during the advance in the St. Mihiel salient.

Lieut. Robert Burton, of the Royal Flying Corps, is the authority for the story.

Lieut. Burton, himself a flyer, took part in the drive. He was shot down and is now on his way to his home in Manitoba with a broken leg.

"Some of your American aviators," he said, "flew for thirty-six hours, only descending for gasoline and bombs and ammunition, and they have demonstrated themselves as being in the top rank of tbe aviators of the world."

U. S. Flyers Down 33 Enemy Planes

With the American Army Northwest of Verdun—American aviators again demonstrated on September 28 that they are the masters of the air on this sector. They engaged in 52 combats and brought down 33 enemy machines without the loss of one American pilot.

The German airmen appear to have lost the daring which had characterized their work of the previous days, and did not venture across the American line with reconnoissance aeroplanes after they had been attacked once by the American machines. The German balloons were hastily lowered in the face of an American attack and did not appear again during the day.

One of the American pursuit groups engaged in 23 combats at low altitudes and brought down three enemy machines. Another pursuit wing had 17 battles in two sorties along the line. A third group dropped bombs on Romagne and Cunel and engaged in battles with German machines, bringing down six of them.

Americans Keep Up Victories in the Air

With the American Army northwest of Verdun.—Aerial activity continues despite the rainy weather. American pursuit groups making sorties from early morning until dark have accounted for twenty German machines and seventeen balloons in the last three days.

The American pilots continue to fly low over the battlefield and harass the troops and supply movements. American bombing squadrons got good results yesterday at Grandpre and at Marcq, southeast of the former place.

American Headquarters in France—The outstanding achievement of the American Army in the offensive is undoubtedly to the credit of its aviators, who have done all that was expected of them and much more.

General Pershing's report on September 28's operations stated that the Americans had "brought down twelve balloons and more than sixty enemy planes, while less than a third of that number of our planes were missing."

On September 28 the distance covered by the aeroplanes of a single wing of the service amounted to 44,150 miles. They fought fifty combats and destroyed nineteen machines without loss to themselves.

One patrol met ten enemy aeroplanes between Charpantery and Ivoiry, sent down one in flames, caused five to crash and drove down two out of control.

Another patrol, diving through a hole in the clouds to drop bombs, came upon seven Fokkers which were almost immediately joined by seven more. The Americans immediately got rid of their bombs and attacked the Fokkers. During a twenty-minute mix-up, which took the combatants from Sommerance to Liny, seven enemy aeroplanes were destroyed and the remainder scattered in all directions.

In addition to these successes the German balloons were literally swept from the sky. Indeed, the maintenance of a single balloon in the air is taxing all the enemy's ingenuity, for these cheerful American youngsters are by no means content with shooting down the balloons at their maximum altitude. Nothing pleases them more than to get a balloon just as it is brought down for the night, or is about to rise in the morning.

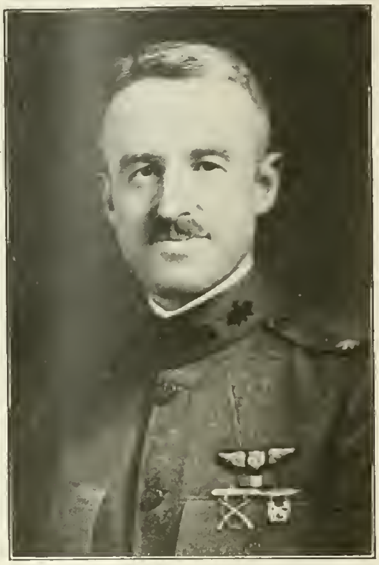
Lieut. Frank Luke, of Phoenix, Ariz., who the other day brought down three aeroplanes and two balloons in ten minutes, is an expert at getting the balloons "in their beds," dropping within 150 feet of the berth to do it and being blissfully indifferent to the riddling of his wings with bullets. In one instance he pounced upon a balloon being placidly towed to its position behind its lorry. Before the drivers were aware of it the gasbag was in flames behind them.

One pursuit group has sixty-five victims to its credit within three weeks after its arrival at the front, thirty-five of these being balloons.

The German balloon has become a rarity on this front any time after noon, and those that survive the day generally perish at nightfall, for it is the twilight period at both ends of the day that is the most favorable time for attack.

An American officer descending in a parachute after his observation balloon had been set on fire by a German aviator has had the experience of being fired upon and having his parachute pierced by machine gun bullets during the descent. When the observer saw the German aeroplane approaching he went over the side of the basket. A second afterward the balloon burst into flames from incendiary bullets fired from the German machine.

The observer was astonished to see the German turn and begin firing on him. Five bullets pierced the parachute, but the observer landed unharmed.



Colonel T. H. Bane is in charge of the Technical Section of the Division of Military Aeronautics, the organization which passes on designs of aircraft and accessories which it receives from hoth the Aircraft Board and from outsiders. This section is now moving from Washington to Dayton, Ohio. This move hrings the entire section closer to its experimental field at Fairfield, Ohio

American Official

The Americans with the British and French dominated the air. Gen. Pershing reports. This fact is believed to have had undoubted effect on the military operations. Gen. Pershing's report follows:

American aviators have kept command of the air. They have brought down twelve balloons and more than sixty enemy planes, while less than a third of that number of our planes are missing. In conjunction with French and British aviators, they have, notwithstanding unfavorable weather, rendered valuable service and successfully executed many missions.

Since September 26 our aviators have shot down more than 100 hostile planes and twenty-one balloons.

Second Lieutenant George L. Bradford, Caproni Pilot at Mineola, L. I.

The D. H. 4

(Statement by Major General Wm. L. Kenly)

A captain of the Air Service, recently arrived from France, has reported to me that the first de Haviland 4 planes with Liberty motors arrived from the United States at stations in France as early as May 13, 1918, and since that date have been coming in ever increasing quantities. This officer left the assembling station in France on August 20. He said that it had been necessary to make some changes on the first planes received, but that each succeeding shipment evidenced better care, and, in general, when he left these aeroplanes were very satisfactory.

In his report he also said: "The performance of the planes was very good, and the plane and motor has become very popular with our pilots. We obtained approximately 130 miles per hour at ground level with one plane, and had without any special preparation obtained an altitude of 10,000 feet in 10 minutes and 21 seconds, full load, excepting bombs. We were able to loop, dive and otherwise stunt these planes exactly as well as we would any chasse plane.

"When I left the post, the planes were arriving at the rate of 15 to 18 per day. The cars were unloaded by our steam crane, and fuselages unpacked in one bay (platform), wings in another bay, and assembly was progressive, similar to the method used in automobile construction.

"After gun test, engine test, and final assembly, the compasses were tested and corrected for permanent magetnism. The machines were then sent to the flying field and were given test flight. After final approval they were then dispatched to stations for assignment to squadron.

"Air-test pilots and ferry pilots were all of the opinion that the plane was excellent. The French ministry thought so well of the Liberty motor that the Under Secretary of State for Aviation, Monsieur Dumesnil, informed me that the French would gladly take every motor we could produce which we could not use ourselves. I was also given the same information by Capt. de Haviland, the designer of the de Haviland plane.

"Lieut. Col. Warwick Wright, Royal Air Force, stated to me that the method of packing the plane was considered by the British to be so good that it could not be improved upon. Out of 750 cases which I inspected, I only discovered one in which the contents were badly damaged."

De Haviland 9 in Record Flight

Flying from McCook Field, Dayton, Ohio, to Bolling Field, Anacostia, D. C., with no stops, a de Haviland 9 plane, equipped with a Liberty engine, made the distance from field to field in three hours and five minutes. Taking the time of actual flight from a point over the city of Dayton to a point over Washington, the time was two hours and fifty minutes, or at approximately 143 miles an hour. The distance between these two cities is estimated at 430 miles, and it takes the fastest train on the Pennsylvania Railroad from 4:50 in the afternoon to 9:00 in the morning on the next day to make this distance.

Caleb Bragg, the civilian pilot, who flew the plane, is attached to the Engineering Department of the Bureau of Aircraft Production. He carried as passenger an engineer officer. The pilot travelled by compass at a high altitude and reported that he had no difficulty in holding his course the entire distance. He also stated that the atmosphere was clear and that he had the advantage of a favorable wind.

Captain Bartlett, Famous Explorer, and Two Aviators, Sold For $40,000 Liberty Bonds

Capt. Robert A. Bartlett, the famous explorer who participated in five Arctic expeditions, and was Admiral Peary's captain in the dash to the North Pole, and two Army aviators, were sold for $40,000 of Liberty Bonds by Mrs. Plummer, of the Liberty Loan Committee.

The sale took place at Terrace Gardens on Svnday, Oct. 6. The Aero Club of America arranged for Capt. Bartlett and two aviators to be present to carry out Mrs. Plummer's novel idea of selling bonds by "selling" Capt. Bartlett and the two aviators.

The plan was also successful the day before when Mrs. Plummer sold two Army aviators sent to her by the Aero Club of America for $25,000.

The bids for Capt. Bartlett were especially lively. In introducing him Mrs. Plummer stated that Capt. Bartlett, who is in the Transport Service, stationed at Hoboken, holds an exceptional record of being accomplished not only in the exploration line, but also in war work. She told how Capt. Bartlett fast winter was selected to perform the difficult task of taking the cruiser "Favorite" out of the ice and read the following letter from Secretary of the Navy Daniels commending Capt. Bartlett for accomplishing this difficult task.

Capt. Bartlett, in his capacity of Captain in the Transport Service, has had a great deal to do with sending troops overseas, but for obvious reasons the Capt. will not talk on the subject.

After the lively hidding Capt. Bartlett was "sold" for $25,000 for tea and the two Army Aviators for $5,000 and $10,000 respectively.

The AIRCRAFT TRADE REVIEW

Canada Buys Flying Boat for Fire Patrol

In line with the decision announced some time ago to improve the system of forest protection, the British Columbia Provincial Government has contracted with the Hoffar Motor **Boat Co.,** of Vancouver, for the construction of a patrol flying boat to be utilized for forest patrol.

Some two years ago this up-to-date method of forest protection was the subject of discussion at a gathering of Northwest lumbermen at Portland, and the idea of an air force of fire wardens was strongly advocated as both practical, economical and efficient. The great stretch of country that an airship could keep guard over, and the ability to distinguish the first beginnings of fire and ripidly get help to the spot to prevent its spread, were factors that appeared to be especially within the province of an air patrol. The idea has been seized upon by British Columbia, and will within a month or two be put into operation.

At first it was thought possible to arrange with the Imperial Government for the leasing a machine from the naval force, one of the obsolete hydroaeroplanes. But this idea has been abandoned in favor of the purchase of a flying boat type, which will be better adapted to the purpose. The machine contemplated will carry the pilot and one fire warden, it will have a wing spread of forty-two feet, and chord of five feet, will develop 100 horse-power, and have a speed of seventy-eight miles per hour, and a climbing capacity of about 3,000 feet in ten minutes.

Britain Is Using the Liberty Motor

(From the British Bureau of Information.)

The engine has always proved to be the limiting factor in the production of aeroplanes. Machines themselves can always be produced in quantities considerably in excess of engines. Large numbers of Liberty engines have been ordered by Great Britain from this country for installation in British machines. The Liberty engine has been described as excellent, and its performances on British testing grounds have been reported as being highly satisfactory.

The present Rolls-Royce engine was designed during the first fortnight of the war, and its horsepower was to have been approximately 250. It took 18 months to develop an engine which would give best results in the air and it has only been within the last six or eight months that this engine has been produced in any quantities, so the United States have done well in designing and obtaining an output of an aeroplane engine in the space of 14 months.

The Liberty engine has been submitted to a thorough test in England and France and in the opinion of experts it is sound and will be greatly improved upon after a few months' use under active service conditions. The Rolls-Royce, though at the moment considerably more reliable, gives slightly inferior performance, but it is as well to remember that the Liberty engine is not the last word in aerial motor construction, and that other experimental engines have been designed and manufactured which excel even the Liberty. Since, however, the Liberty engine has now been put on a productive basis, and great numbers are being turned out daily, we want as many of them as we can get; otherwise, by the spring of next year, we shall have many machines in storage without engines.

In the early days of the war the British expeditionary forces went over to France with some 60 odd machines of every type, which were used for every purpose. Nowadays there are special types of machines built to carry out certain functions, and among them are the following:

Fighter—high altitude—Single seater machines, giving the highest possible performance, which attack all enemy machines that may cross our lines.

Fighter—low altitude—Single seater machines, giving the highest possible performance, which attack all enemy machines that may cross our lines.

Fighter—low altitude—Single seater armored machines for low flying work, and attacking infantry formations on the ground.

Fighter—reconnaissance—Usually a two seater machine of high performance, which flies a considerable distance behind the enemy's lines, and is used for reconnaissance work or protecting bombing machines.

Corps reconnaissance—Two seater machines of moderate performance, which do photographic work and artillery observation.

Day bomber—A high performance long range machine, with large bomb carrying capacity.

Night bomber—Similar to the day bomber, but with greater carrying capacity and less speed.

Personal Pars

Graham W. Brogan has been appointed advertising manager of the Duesenberg Motors Corp., Elizabeth, N. J. He was formerly assistant to the general sales manager.

To Make Aeroplane Parts

Milwaukee, Wis.—The Lochman-Mayhew High Speed Propeller Co. has been organized at Milwaukee to engage in the manufacture of aircraft and hydroaeroplane parts. Articles of incorporation have been filed and give the capital stock as $1,000, which is to be increased later. The principals in the new organization are Emil R. Lochman, owner of the Lochman Machine Co., and William H. Mayhew, first vice-president of the Mayhew company, cabinet and furniture manufacturer.

Range of Travel Governing Factor in Aeroplane Future

Detroit.—Range of travel is the greatest problem which must be solved in determining the future of the aeroplane industry, according to C. F. Kettering, president of Delco and the S. A. E. President Kettering's address was given on the occasion of the first Detroit Section meeting for the year, held at the Hotel Pontchartrain on September 20.

The topic, "The Future of the Aeroplane Industry After the War," was of popular interest in this section, as shown by an attendance of 600 local S. A. E. members and their friends. Mr. Kettering largely repeated the address he gave before the Cleveland Section.

Inspection of Aircraft Factories Complete

The War Department authorizes the following: W. C. Potter, Acting Director of the Bureau of Aircraft Production, who has returned from an inspection of factories engaged in the manufacture of engines and planes, announced that the output of Liberty engines was fully up to expectation and had reached quantity production. Planes were now going ahead rapidly, he said, and were being shipped in trainload lots daily.

Aerial Posts in Morocco

In connection with the inauguration of aerial mails in France, it is pointed out that for over a year aeroplanes have been officially used in Morocco for linking up the various units. Each sub-division has a squadron at its disposal, the airmen ensuring a service between the chief town of the sub-division and distant outposts. They carry the ordinary mails, urgent despatches, and telegrams impossible to send by wire. Finally, they see that certain posts are kept in funds. All these activities are carried out automatically, without interferring with the normal service of the bombing, photographic, and patrol squadrons. It is suggested that in future it might be possible, by means of an agreement between the Morocco Protectorate and the Government of Algeria to establish aerial postal communication with the great North African colony, which would benefit no less than Morocco by the economy in time and expense thus assured.

Goodyear Engineer Goes to Government

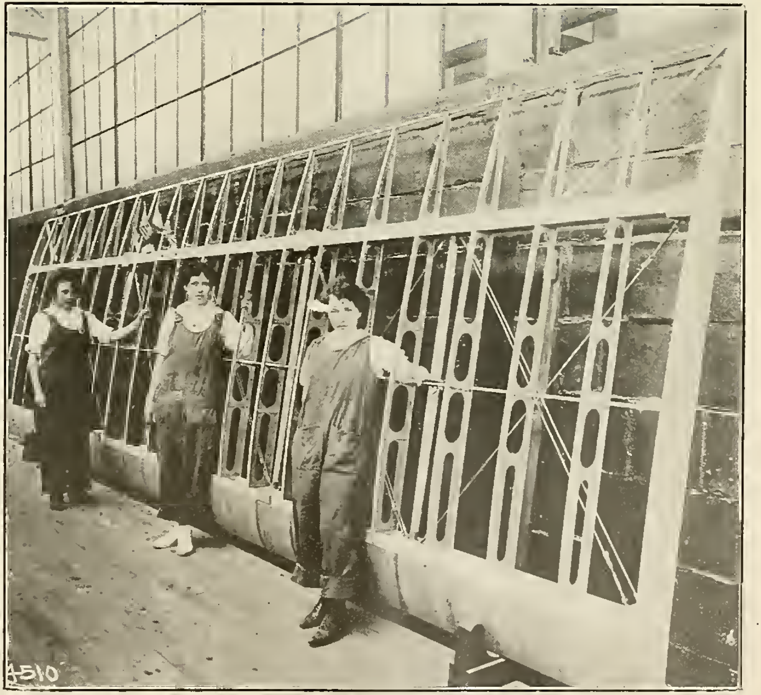
William S. Wolfe, assistant chief experimental engineer of the Goodyear Tire & Rubber Co., Akron, Ohio, has entered the service of the maintenance division of the United States Government Motor Transport Corps, with headquarters at Washington, D. C. His six years' experience in tire development with the Goodyear company well equips him for his present duties in assisting in looking after the maintenance of all tires, rims and wheels in the motor transport service.

New Directors for Standard Aircraft

Elizabeth, N. J.—Joseph A. Bower, vice-president of the Liberty National Bank of New York, and Henry J. Fuller, vice-president of the Fairbanks-Morse Co., have been elected directors of the Standard Aircraft Corp. and the Standard Aero Corp. of New York.

Franklin to Make Hispano-Suiza Parts

Syracuse.—The H. H. Franklin Mfg. Co. has received a contract from the Wright-Martin Aircraft Corp. for parts of Hispano-Suiza engines.



Women have taken up numerous kinds of munition work. Here is shown some of the work they are doing in the aircraft factories

Second Assistant Secretary of War John D. Ryan, Acting Director of Aircraft Production W. C. Potter, and Major General William S. Kenly, Director of Military Aeronautics

Officers of the Air Service Clubs Association

The Army Air Service announces the organization of the Air Service Clubs Association, which will incorporate all local Air Service Clubs recently organized at some of the flying fields and training stations.

The purpose of the Association is to promote the efficiency of the Air Service; to foster esprit de corps by maintaining its best standards and traditions, to disseminate professional knowledge and provide means for social activities at all places where members are stationed.

All officers of the various branches of the Air Service, civilian employees who are heads of departments of the Air Service and all foreign officers on duty with the Air Service are eligible to membership.

The second meeting of the Association was held in the Interior Building at Washington, on Tuesday, October 2, and was attended by about 300 officers of the Air Service stationed at Washington. Major General Wm. L. Kenly, Chief of the Division of Military Aeronautics, presided. Captain J. H. Packard, head of the Aeronautical Information Branch of the Air Service, acted as Secretary. Following the adoption of the constitution, an election of officers was held, and the following officers were elected:

Major General Wm. L. Kenly, President; W. C. Potter, 1st Vice-President; Col. G. C. Brant,, 2nd Vice-President; Col. G. C. Edgar, Treasurer; Lt. Col. H. S. Brown, Assistant Treasurer; Captain John H. Packard, Secretary, and 1st Lieut. Tom Poe, Assistant Secretary. John D. Ryan, Assistant Secretary of War, was elected chairman of the Board of Control, and the following were elected members of the Board of Control: Col. H. H. Arnold, Col. W. E. Gillmore, Col. C. A. Seonne, and Mr. A. A. Landan, for one year; Col. Arthur Woods, Col. F. R. Kenney, Col. G. H. Crabtree, and Mr. C. W. Nash, for two years; and Col. A. L. Fuller, Lt. Col. B. F. Castle, Lt. Col. Millard F. Harman, Jr., and Major Wm. R. Malone for three years.

It is the purpose of the Air Service Clubs Association to issue a magazine periodically and to organize clubs at all Air Service flying fields and stations.

Members of Association Will Enjoy Privileges of Aero Club of America and Affiliated Aero Clubs in All Allied Countries

The members of the Air Service Clubs' Association will enjoy the privileges of the Aero Club of America and affiliated aero clubs in all allied countries. Through this co-operation with the Aero Club of America the members of the Air Service Clubs' Association will enjoy the privileges of the club house in New York, the new Allied Aviators' Club of the Aero Club of America in Paris, the Aero Club of France, the Royal Aero Club of Great Britain, the Royal Aero Club of Italy, etc., etc.

General Kenly Witnesses Test of New Oxygen Apparatus

A new style oxygen apparatus, designed to enable aviators to fly at high altitudes, was given an official try-out in connection with the War Department at Grant Park, Chicago, on Sunday, September 8th, before a group of prominent officials of the air service of the government. Among those who witnessed the test were Major General W. L. Kenly, Director of Military Aeronautics; Brigadier General T. C. Lyster, M. C., of the Air Service Division; Surgeon General's office; Lieutenant Colonel Isaac Jones, M. C.; Lieutenant Colonel C. K. Rhinehardt, and Lieutenant Colonel E. R. Lewis, M. C.

The flight was made by Lieutenant M. B. Kelleher and State Senator Albert C. Clark of Illinois in one of the new model De Haviland 4 aeroplanes, equipped with a Liberty motor. In view of the nature of the flight, unusual precautions were taken to have the plane in first class condition. Before the machine was permitted to go up, Lieutenant Kelleher and Senator Clark were given a thorough physical examination by General Lyster personally.

According to the official report of the flight, the aeroplane left the ground at 12:55 P. M. The pilot took a southerly course mounting to fifteen thousand feet in seventeen minutes. At nine thousand feet it was necessary to detour around a large cloud bank so that the machine would not become moistened and affected by the low temperature in higher altitude. Slight motor trouble impeded for a few minutes the upward flight of the machine but the source was found quickly and corrected.

It took the aeroplane thirty-five minutes to climb from fifteen thousand to twenty-three thousand five hundred feet during which time, the report continued, exceptionally fine atmospheric conditions were encountered. A temperature of seventeen below zero was recorded at this altitude.

As soon as the rarity of the air became noticeable the flow of oxygen in the apparatus was permitted to start. The device functioned perfectly from the start, Lieutenant Kelleher and Senator Clark reported. Breathing was as natural, they said, as on the ground.

The pilot was compelled to start the descent to earth at the height of 23,500 feet, as the danger signal showed on the apparatus. At this height, the pilot and passenger said, they were able to breathe with ease by means of the device.

The aeroplane descended at the rate of a thousand feet a minute. The descent from the maximum altitude to the earth took twenty-five minutes. Both pilot and passenger experienced slight physical discomfort for a time by reason of the extremes of temperature.

In the opinion of Lieutenant Kelleher, the maximum altitude had not been reached. Additional tests may be made in the future to determine the effectiveness of the oxygen apparatus at greater heights in the air. Lieutenant Kelleher was enthusiastic over the performance of the De Haviland 4.

Aero Club's Annual Meeting

THE annual meeting of the club will be held at the club house, 297 Madison Avenue, New York City, on the second Monday in November, 1918, at 8:30 P. M.

Whereas a large part of the members of the Aero Club of America are in Government service and their addresses changed constantly, and that it takes longer for mail to reach them; and Whereas, the Government has issued instructions that Christmas presents for men overseas shall be mailed before November 12, therefore, the system of transportation of mail may be congested in the latter part of October and early in November, and Whereas, it is a patriotic duty of the Club to assist the Government and our members by mailing any notices or reports before the October and November rush; the Executive Committee, acting under Article 3, Section 2, of the Constitution, resolved to send out notices of the annual meeting to non-residenet members and to members who are known to be in Government service immediately.

Following are the nominees for officers and governors: For President, Alan R. Hawley; for Vice-President, Henry A. Wise Wood; for Second Vice-Presideent, Godfrey L. Cabot; for Third Vice-President, Rear Admiral Bradley A. Fiske; for Fourth Vice-President, Chas. Jerome Edwards. For Governors, Class A, Term Expiring 1922, Lieut.-Col. James A. Blair, U. S. A.; Henry Woodhouse, Allan A. Ryan, Rear Admiral Bradley A. Fiske. Class A, Term Expiring 1921, William Hawley. Governors, Class B, Major Albert B. Lambert, U. S. A.; Henry B. Joy, Lieut. Godfrey L. Cabot, U. S. Navy; George M. Myers, John Hays Hammond, Jr., Alberto Santos-Dumont, Brig.-General Robert K. Evans, U. S. A.; Major Max C. Fleischman, U. S. A. For Treasurer, Lieut.-Col. Charles Elliot Warren.

It is proposed to amend Chapter IX of the By-laws to meet the exigencies of war and enable the club to better protect the welfare of the United States, Allied Countries and the Aero Club of America.

The activities of the Aero Club of America during the past year have been extensive. The Army and Navy membership of the club has increased by over 350, due to the popularity of the club with both branches of the Service. A considerable number of military aviators applied for memeership from France, their desire to become members has been created by learning of the club's remarkable work in the assisting of the building of our Air Forces, and in helping the members of the Air Service in every possible way in the United States as well as overseas.

The club has assisted and is assisting in the building of the Air Service from every standpoint. Its efforts to make Congress recognize the necessity of a substantial Air Service and its efforts which resulted in training 300 aviators at private expense, who were taken in the Army and Navy upon America's entering the war, and who were the first 300 aviators to be sent overseas, are matters of history, thoroughly appreciated by the American and Allied Governments.

The club's care of the members of the Air Service begins with giving advice to candidates who wish to join the Service, directing them to the proper authorities and supplying them with any information which may speed up their entering the service and their becoming efficient. From the time they join the Service to the time they are ready to go overseas, the club acts as their adviser, and when it becomes necessary it helps them in other ways. During the early part of the year it become necessary for the club to represent the Army and Navy aviator's before Congress, preventing the cutting down of the aviator's pay. During the past winter and early spring the club assisted in looking after the welfare of members of the Air Service who need clothing and equipment while training and when going overseas.

The club looks after the welfare of the aviators overseas through its Foreign Service Committee, which has headquarters in Paris and which looks after the interests of the Air Service as closely as the club does in the United States, supplying aeronautic books and magazines, aeronautic maps, athletic equipment, games, etc., etc., and otherwise contributing in every way possible to their general comfort. The funds for this work have been procured under the auspices of the club.

The Foreign Service Committee also assists in locating aviators who are missing or prisoners, notifying parents, and represents the club and parents, whenever possible, at the funerals of those who have died in service.

When an aviator distinguishes himself, he is awarded the Aero Club of America's Medal of Honor, which is very much appreciated and sought after, not only by the American, but also by the Allied aviators. The club has received personal letters of appreciation of Medals from the two premier French Aces, Lieut. Fonck and Lieut. Nungesser, who called in person at the offices of the Foreign Service Committee to express their appreciation. While they were at the office, an enormous crowd of admirers gathered outside, and when the two aviators with the members of the Foreign Service Committee drove through the streets they were showered with roses.

The letters from American and Allied officers and from the highest American and Allied authorities, and from parents and aviators, and from patriotic Americans, praising the patriotic work of the Aero Club, would fill many books. They are being preserved, and it is possible that after the war they will be reproduced in book form, to make a historic record of the club's contribution to the prosecution of the war.

The club has continued its constructive activities for the extending and upbuilding of our Air Forces, fostering the developments of the aeronautic industry and the establishing and extending of the Aerial Mail Service, and educating the nation to its aeronautic task. It has also been active in the Liberty Loan, War Savings Stamps and Red Cross Campaigns.

The club has 800 members in the Service, all serving as commissioned officers, with a few exceptions, who are working with civilian status in different departments of the Government.

Aerial League of America Elections

THE election of directors of the Aerial League of America was held at 297 Madison Avenue, New York, on September 30.

The following directors were unanimously elected, over one thousand members voting in person or by proxy.

Directors, term of office to expire in August 1922: Rear Admiral Robert E. Peary, Alan R. Hawley, Henry Woodhouse.

Directors, term of office to expire in August, 1921: Henry A. Wise Wood, Charles Jerome Edwards, Augustus Post.

Directors, term of office to expire 1920: Brigadier General Robert K. Evans, U. S. A., Mrs. Henry A. Wise Wood, Mrs. William A. Bartlett. Directors, term of office to expire in August, 1919: Hon. Murray Hulbert, John Hays Hammond, Jr., Mrs. Marie E. Peary Stafford.

The League during the past year has done an enormous amount of patriotic work. It had a Float in the First Liberty Loan Parade in New York, and its officers and many of the members delivered addresses and participated actively in other ways in each of the Liberty Loan, War Savings Stamps, and Red Cross campaigns.

The League contributed largely to the success of the French Aerial Warfare Exhibit. One of the League's officers, Mr. Henry Woodhouse, was elected by the French authorities to be the Honorary Director of the Exhibit, and has acted in this capacity since last March, making all the arrangements to send this wonderful exhibit through the United States. As a result, not only has great interest been created in winning the war, in building our air forces, and in the Liberty Loan and in the Red Cross, but over $50,000 has been raised for the orphans of French aviators and maimed aviators.

The League has conducted a very extensive educational campaign, sending speakers to deliver addresses and showing aeronautic films to different parts of the country. It also took a prominent part in the establishing and making a success of the Aerial Mail Service, which has an important value from a military as well as a commercial standpoint, and supplied aeronautic literature to army and navy aviation stations.

These are only some of the important things accomplished during the past year by the League, the offices of which have become the clearing house to which officers and men in the Air Service, and men, women, and boys and girls write for advice and information.

On motion it was resolved to elect to honorary membership of the League Second Assistant Secretary of War John D. Ryan, Major General William L. Kenly, Director of Military Aeronautics, Second Assistant Postmaster Otto Praeger and Captain B. B. Lipsner.

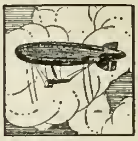
A vote of thanks was expressed to Mr. Henry Woodhouse for his energetic work on behalf of the League. By his work Mr. Woodhonse has put the League on a self-supporting basis and membership of the League up to over 4,000 members, and extending its work overseas.

A vote of thanks was also extended for the hearty and substantial co-operation given to the League by officials of the Aero Club of America, especially by Messrs. Alan R. Hawley, Henry A. Wise Wood, and Augustus Post.

A hearty vote of thanks was extended to the Aero Club of America and its officials, not only for the assistance given to the League, but also for the inspiring example set by the club in every line of patriotic and aeronautic endeavor.

Expressions of appreciation were voted to Mrs. William A. Bartlett, chairman, and Mrs. Eliot Butler Whiting, Mrs. C. Lansing Baldwin, and Mrs. John H. Booth, members of the Aviation Committee of the National Special Aid Society; and to Mrs. Charles A. Van Rensselaer, Mrs. Henry A. Wise Wood, Miss Alice Carpenter, Miss Amy Grant, and Miss Portia Willis for their splendid work in looking after the welfare of our aviators.

MILITARY AEROSTATICS



By Lieut. H. K. BLACK, R. F. C., C. F. A.

A VERY necessary thing for a balloon bed is dryness. This, of course, is a relative term in France, and so long as a balloon bed is well drained that is about all that can be expected. The bed can be trenched around the same as a tent, but a word of advice, if you trench around a balloon bed, be very sure that you cover the trench with duck boards of some kind. Otherwise sometime, when the crew is holding down the balloon two or three are going to fall into the trench or rather step into it, and then there is going to be trouble. I once knew of a balloon blowing away just from that, and several of the crew who held on till they were well off the ground fell thirty feet or so and were badly smashed up.

However, when the site of the balloon bed has been decided upon, as I said before it should be sheltered and drained, a gentle slope is not a bad position,—the preparation is an important part of the subsequent success of the bed. The bed must be very smooth. If it is so naturally, so much the better, but if it is lumpy, or rocky, or has small almost buried roots, these must be removed before proceeding further. In France, on several occasions, we removed roots and stumps by blasting. We found this very satisfactory. It not only removed the roots and stones but it also stirred up the subsoil in such a manner that drainage was facilitated. The ground after the blasting should be ploughed a bit and the roots taken out, put back in the holes and the whole covered with earth. The earth when smoothed should be covered with broken rock or small gravel. In France, particularly in the coal region, the slag from the mines makes an ideal bottom of the bed. A layer of slag broken into small pieces should be used for a top layer and then a top dressing of fine sand laid on. The top layer and the top dressing should be crowned slightly in the center. On top of this prepared bed the ground cloth of heavy tarpaulin or canvas should be laid and stretched tight. The cloth should be made fast to the ridge wire around the edge of the bed. This ridge wire is a thin steel cable which forms the periphery of the actual bed itself. It is fastened very securely by means of screw pickets screwed into the earth and one needn't be afraid of getting it too secure for it has a very heavy strain to bear. I have seen a four-foot screw picket, yes, several of them, torn out of the ground like a rotten tooth when a wind storm caught the balloon.

Of course a balloon offers a wonderful target for the wind when it is on its bed and it is almost unbelievable what a strain the ridge wire is under. One storm we had, I remember, we had the balloon weighted down with sandbags until we thought the bridles of the rigging would break. We put canvas bridles over the balloon, we weighted the mooring lines, we did everything we could think of to keep the gas bag on her bed, yet all our efforts were unavailing. An extra gust of wind hit her broadside and the balloon broke the mooring lines, the canvas bridles, tore the ridge wire out of the ground, bringing with it the screw pickets and numerous straight wooden pickets.

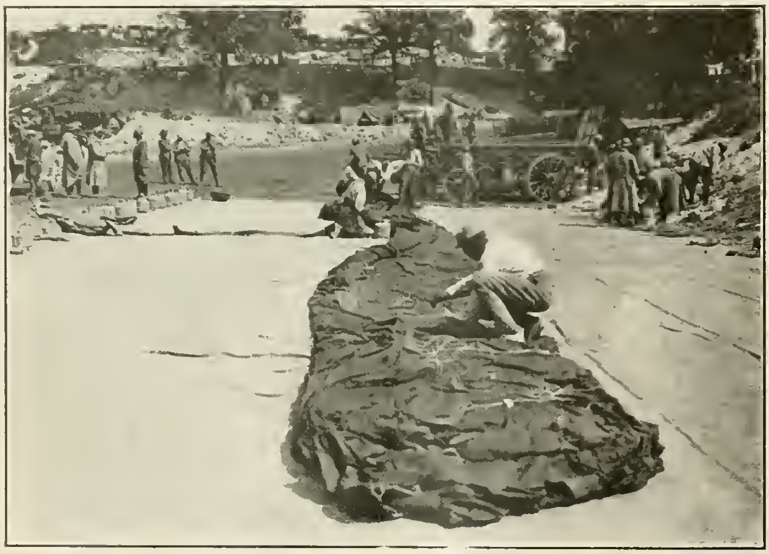
Incidentally, here it might be remarked that it is standard practice to fasten the rip cord securely to a separate picket driven well into the earth. On this occasion that did not do us any good. The rip cord simply tore the picket out of the ground and the balloon did not rip. There was so much weight on the gas bag, somewhere in the neighborhood of a ton, that she couldn't rise even when she did get away. She floundered along the ground with the wind, treating several tents which were in her path very much the same as if she had been a tank instead of a well brought up civilized balloon. Next she bumped through an artillery horse lines, shedding sandbags en route, much to the consternation of the horses, who just naturally stampeded. Finally the old sausage charged a tree with the evident intention of flattening it out. The tree, however, proved to be an old customer who had been through several battles and was still standing. The sharp, jagged branches crashed through the envelope, the gas rushed out whistling, the sausage shuddered, and in a very few seconds a perfectly good balloon was hanging, a mass of shredded fabric, entirely deflated, on the old tree. Yes, the ridge wire should be put down securely.

Stakes are driven, out from the sides of the bed, and also at the ends for the mooring lines.

It is very important in connection with bedding down a balloon, that the bed be kept absolutely clean. Small stones, twigs, even a little bit of mud or clay, will soon wear a hole in the fabric of a balloon, particularly if the balloon is not absolutely tight on its bed. This is seldom the case, as almost always there is a little regular chafing movement of a sausage on its bed. To bag a balloon down to its bed so tightly that there is no possibility of movement necessitates so much sand on the rigging as constitutes a strain on it. The valve cord must be let go of course else the valve would act from the increase of internal pressure. Then, of course, with the valve let go, the pressure on the interior of the envelope is apt to rise to or beyond the straining point.

The saddle referred to previously is a canvas strip or in some cases a canvas sheet which is put over the top of the balloon and moored securely to the ground outside the ridge wire. It is of great assistance in keeping a balloon on its bed during a wind storm. During the windy season, however, and in fact almost any time, a screen is a very necessary thing. This screen is naturally placed in those cases where a balloon is bedded down among trees, or between avenues of trees. In cases where a balloon is bedded down in the open, however, it is necessary to erect a screen. Practice only will tell one what kind of a screen is best.

(To be continued)



Laying out a French observation balloon in France. The ground cloth is spread on the bed and the balloon removed from its covering and stretched out, unfolded from the centre outward and the rigging attached. It will be noted that the bed is sited in a well sheltered position. The men work on the balloon bed either in their stocking feet or else in soft rubbersoled shoes. The filling hose may be seen running toward the middle of the balloon. The sand bags seen in the left background are used for holding the balloon on its bed, and not, as some people seem to think, as a protection from fire. In the far background may be seen some very typical dugouts; in fact the whole scene is one which is very common in France

THE SOPWITH "CAMEL"

THE following facts and photograph of the Sopwith "Camel" have heen translated from a German contemporary:

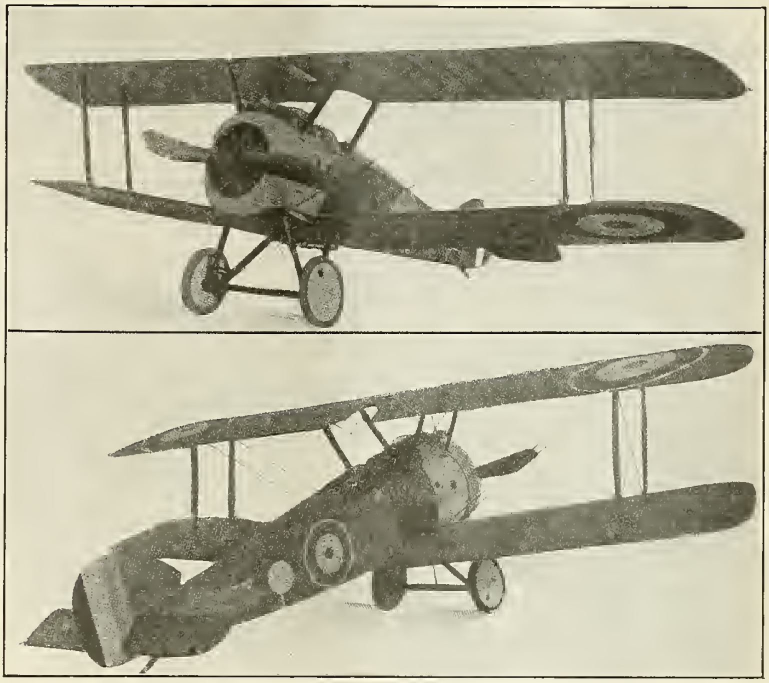
This machine, huilt hy the Sopwith Aviation Co., Ltd., of Kingston-on-Thames, carries the designation F.1 B. 6290. It is a single-strutter machine and is a development of the Sopwith "Pup," from which, however, it differs in many details, apart from the greater power of its engine.

As in the older type, the wings and tail plane with elevator are of trapezoidal plan form, hut the greatest span occurs at the trailing edge. The top plane centre-section has a span of 2.17m., while tbe strut attachments are only 1.48m. apart. As the petrol pressure tank and gravity tank are placed rather far aft, the pilot's seat is placed immediately hehind the motor, underneath the top plane centre-section. In order to provide a hetter view, a rectangular opening is cut in the centre section. The longitudinal edges of this opening are provided with three-ply plates projecting heyond the wing profile so as to reduce the amount of air flowing over the edges. To facilitate getting into and out of the machine the trailing edge of the centre-section has heen cut away. Upper and lower planes have an equal span of 8.57m., and an equal chord of 1.37m. The aspect ratio is therefore 6.25 against the aspect ratio of 5.15 of the older type.

The wing spars, wbich are made of spruce, are spindled out to an I section, with the exception of the hottom rear spar, which is left solid. The gap between the planes is 1.31m. at the tips and 1.52m. near the hody. (In the older single-seater the gaps were 1m. and 0.86m., respectively.) The upper plane is staggered forward 0.45m. There is no sweephack. The dihedral angle of the top plane is 178 deg. and of the bottom plane 170 deg. The angle of incidence of the top plane is 2 deg. at the centre-section, 3 deg. at the tip. The hottom plane has a uniform angle of incidence of 3 deg.

The inter-plane struts, which are of solid spruce of Streamline section, are, as in all Sopwith machines, placed with their ends in steel shoes welded to the fittings on the wing spars, and are provided with no further attachment. The lift wires and landing wires, of which the former are in duplicate, are in the form of stream-line wires.

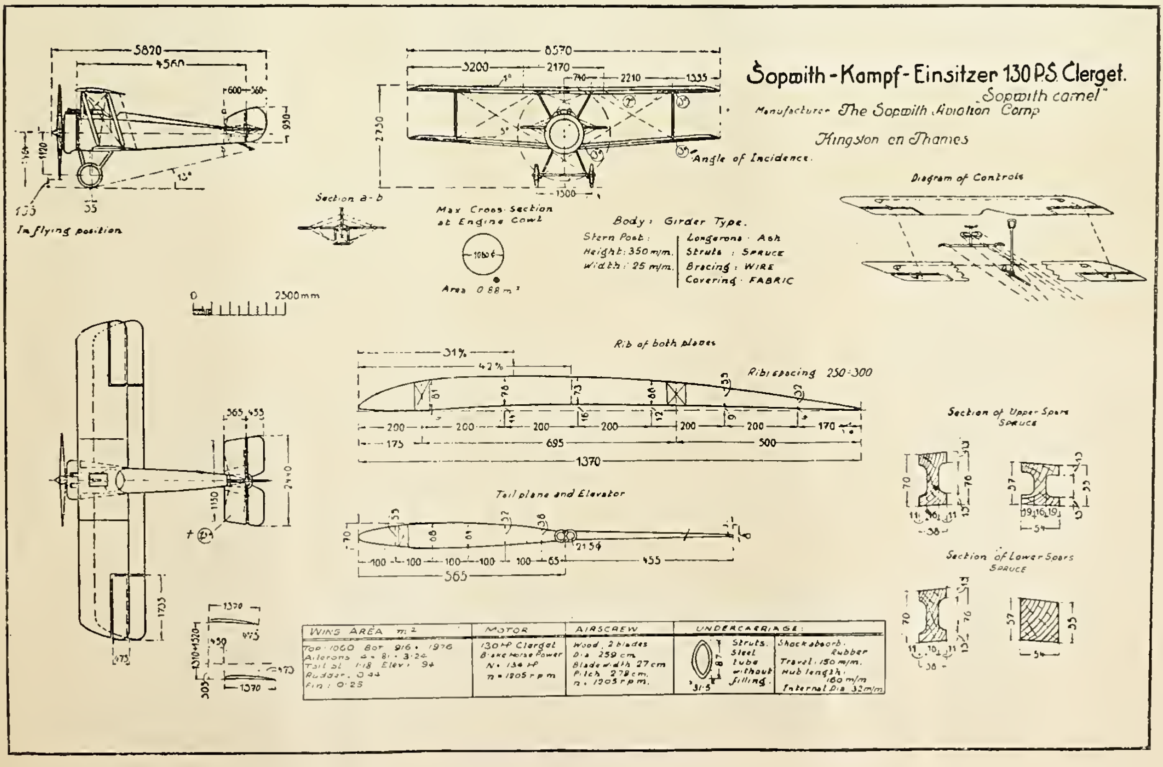
Non-balanced ailerons are fitted to the rear spars of both planes. The wing fahric, which is sewn on to the ribs, is cream colored underneath, and the top surface, as well as the body fabric, is painted a redish brown. The body, which is of the usual girder type with four longerons, has a rounded top. The undercarriage is of the usual Sopwith type. A divided aluminum axle rests in a stream-line covering of wood. The axle hinges are hraced from the fuselage.



Two views of the Sopwith "Camel"

The tail plane, which is deeply cambered on hoth sides, is rigidly attached to the upper body longerons, with an angle of incidence of 1.5 deg. The tail plane trimming gear hitherto fitted to all Sopwith machines has heen ahandoned, in spite of the fact that tbe petrol tanks are placed hehind the pilot's seat. The fin and rudder are of the usual cbaracteristic Sopwith form.

The 130 h.p. Clerget motor, which is built by Gwynnes, Ltd., develops about 134 h.p. at 1,200



WING AREA m²	MOTOR	AIRSCREW	UNDERCARRIAGE:	
Top 10.60 Bot 9.16 = 19.76 Ailerons 4 × .81 = 3.24 Tail Pl. 1.18 Elev. .94 Rudder. 0.44 Fin : 0.25	130 HP Clerget Brake Horse Power N = 134 HP n = 1205 r p m	Wood, 2 blades Dia. 259 cm. Blade width 27 cm Pitch 278 cm. n = 1205 r p m.	87 31.5 Struts. Steel tube without filling.	Shockabsorb. Rubber Travel: 150 m/m. Hub length: 160 m/m Internal Dia 32 m/m

r.p.m. According to a plate in the pilot's cockpit the revolutions of the engine are not to exceed 1,250 r.p.m.

In the pilot's cockpit are the following instruments, &c.:

In the centre on the instrument board: Monometer, with safety valve, clock, pressure gauge, altimeter, compass, two switches, revolutions indicator, and pulsometer. On the right: The hand-pump (air). On the left: Control levers for pressure and gravity petrol tanks, petrol tap, throttle lever, petrol level indicator for pressure tank, Bowden cable for bomb release. A propeller air pump for the pressure tank is mounted on the starboard chassis strut. Two fixed Vickers guns are mounted on top of the fuselage. Their locks and feed block levers are inside the body covering. Between them is a telescopic sight. In a bomb rack under the body can be carried four bombs, the Bowden controls for which are placed to the left of the pilot. There is no bomb sight fitted.

The weight of the machine empty was ascertained to be 430 kg. With tanks full the weight of the fuel is 150 kg. With pilot and armament the useful load would then amount to 290 kg. It is therefore to be assumed that the weight of about 50 kg. of bombs is only carried when the tanks are not full. Assuming a useful load of 290 kg. the total weight "all up" amounts to 720 kg. As the wing area is 19.76m², the unloading is 36.5 kg. per sq. m., and the loading per h.p is 720; 134 = 5.37 lbs./h.p. The corresponding loadings for the Sopwith "Pup" were 23.4 and 6.6, respectively. The "Camel" has, therefore, a higher wing loading, but a considerably smaller loading per h.p.

THE A. E. G. ARMORED BIPLANE

The Technical Department of tbe Britisb Air Ministry has issued the following report and description of the A. E. G. Armored Biplane:

This aeroplane is designed for the purpose of carrying out offensive patrols against infantry, and is furnished with armor, which affords protection for its personnel. This armor appears, however, to be more or less experimental.

In general construction it closely follows the lines of the A. E. G. Twin Engined Bomber G. 105, reported on in I. C. 606, though the arrangement of tbe power plant is, of course, entirely different.

A steel tubular construction is used practically throughout. The machine was badly crashed, and some details are, therefore, not available; but the General Arrangement Drawings at the end of this report may be regarded as substantially accurate.

The leading particulars of the macchinc are as follows:

Area of upper wings	190.4 sq. ft.
Area of lower wings	168 sq. ft.
Total area of wings	358.4 sq. ft.
Area of upper aileron	11.2 sq. ft.
Area of lower aileron	10 sq. ft.
Area of tail plane	9.4 sq. ft.
Area of fin	7.6 sq. ft.
Area of rudder	6 sq. ft.
Horizontal area of body	48.6 sq. ft.
Side area of body	54.8 sq. ft.
Cross sectional area of body	14.4 sq. ft.
Area of side armor	33 sq. ft.
Area of bottom armor	29.4 sq. ft.
Area of armor bulkhead	10.4 sq. ft.
Engine, 200 h.p. "Benz."	
Crew—pilot and gunner	360 lbs.
Armament—three guns.	
Petrol capacity	38 gallons
Oil capacity	3 gallons

The manner in which the wings are constructed is exactly as shown in the report of the A. E. G. Bomber—i. e., the spars consist of two steel tubes 40 mm. in diameter by 0.75 mm. thick. At their ends the upper and lower surfaces of the spares are chamfered away, and flat plates welded in position, so as to provide a taper within the washed-out portions of the wing tips. The wings were, unfortunately, so badly damaged that no accurate drawing of their section can be taken, but there is evidence that this very closely follows the section of the bomber, which has already been published. The ribs are of wood, and between each main rim is placed a half-rib joining the front spar to the semi-circular section wooden strip which forms the leading edge. Tbe wing construction is strengthened by two light steel tubes passing through the ribs close behind and parallel to the leading spar, which are used for housing the aileron control wires. The bracing against drag consists of wires and transverse steel tubes welded in position. At the inner end of the wings special reinforced ribs of light gauge steel tube are provided. The spars are attached to the fuselage by plain pin joints.

Tbe centre section of the upper surface is constructed in a similar manner to that of the wings, except that it is considerably reinforced, and the spars are larger in diameter. The leading spar has a diameter of 51 mm. and the rear spar 45 mm. The centre section is secured to the fuselage by a system of stream-lined steel struts, the feet of which terminate in ballends dropped into sockets, and there bolted in position.

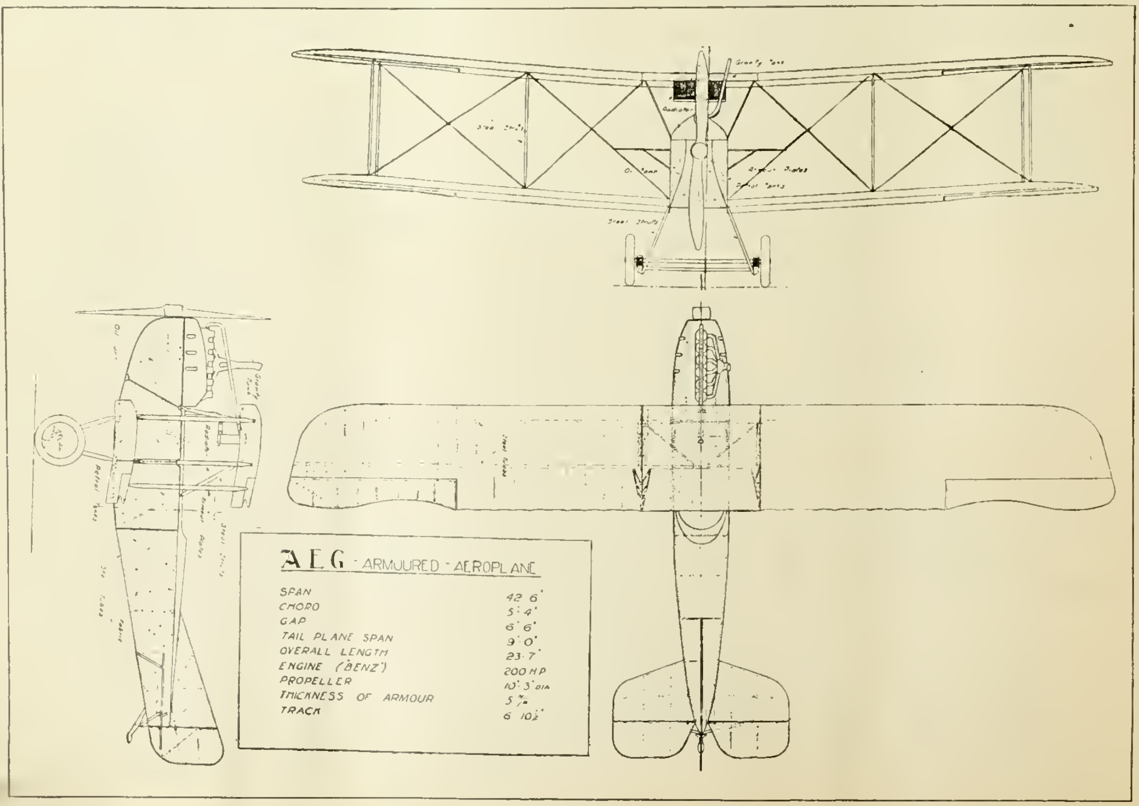
The centre section contains an auxiliary gravity petrol tank, and also the radiator, and is, therefore, substantially braced with steel tube transverse members.

The wings are set with a dihedral angle of approximately 6 deg.

The aileron framework is of light steel tube throughout, the tube forming the trailing edge heing flattened into an eliptical section. The ribs are fixed by welding. The framework of the ailerons on tbe upper wing is reinforced by diagonal bracing of light tube.

These are of light steel tube streamline in section, tapered at each end, and terminating in a socket which abuts against a ball-headed pedestal carried on the wing spars; through the socket and the ball is passed a small bolt. The manner in whicb this attachment is carried out is exactly similar to that described in the report on the A. E. G. Bomber.

The whole of the fuselage is built up of steel tubes welded together, and baving affixed at their junctions sheet steel lugs, which serve as the anchorage for the bracing wires. The diameter of the longerons and of the frame verticals is 20 mm., except the last three members adjacent to the tail, of wbich the diameter is 16 mm. The welding throughout the fuselage appears to be of very high quality. In Fig. 2 is illustrated a joint, which occurs in the fuselage immediately in front of the pilot's cockpit. The longeron is, from this point to the rear of the gunner's cockpit, fitted with a wooden strip taped in position. Tbis joint shows the method in which the cross bracing wires are furnished with an anchorage. In one or two points in the frame con-



struction the bracing wire lies in the same plane as the transverse tube, and to allow for this a diagonal hole is drilled through the tube, and filled in with a small steel tube welded in place.

This consists of a triangulated arrangement of steel tubes carrying hollow rectangular section steel bearers, on which the crank chamber is slung. The bearers are well trussed both in the vertical and horizontal planes, and are shown in dotted lines in the General Arrangement Drawings. The engine bearers themselves are 2 mm. in thickness, and have an approximate sections of 2 1/16 ins. by 1½ in.

The empennage possesses no particular points of interest, the planes having the usual tubular framework. The tail plane is not fitted with any trimming gear, but a method of adjustment is provided. This is shown in Fig. 3, which is self-explanatory. The diagonal struts which proceed from the base of the fuselage to the tail plane spar are fitted at each end with a method of adjustment shown in Fig. 4, allowing them to be extended as required according to the particular socket which is used to carry the leading edge of the tail plane. Neither the elevators nor the rudder are balanced. The rudder post is mounted on the end of the fuselage, as shown in Fig. 5, in which it will be seen that the vertical frame tube of the fin is very stoutly attached to the frame by a triangulated foot.

THE HANNOVERANER BIPLANE

THE Technical Division of the British Air Ministry have issued the following report on the Hannoveraner biplane:

This machine was brought down by anti-aircraft fire near Lestrem, on March 29, 1918. As will be seen from the photographs, it is of highly characteristic design, and possesses numerous features of interest.

On labels protected by celluloid, and on the upper surfaces of the wings and fuselage, are identification marks with the date 15/2/18, showing that this machine is of recent construction.

Generally speaking, the construction is of wood throughout, steel being used sparingly, except in the interplane struts, landing chassis struts, centre section and some details of the tail.

Judged by contemporary British standards of design, the Hannoveraner biplane reaches a fairly high level, the construction throughout being sound, and the finish quite good.

The performance of the machine is not by any means bad.

The leading particulars of the machine are as follows:—

Weight Empty, 1,732 lbs.
Total Weight, 2,572 lbs.
Area of Upper Wings, 217.6 sq. ft.
Area of Lower Wings, 142.4 sq. ft.
Total Area of Wings, 360.0 sq. ft.
Loading per sq. ft. of Wing Surface, 7.29 lbs.
Area of Aileron, each, 16.4 sq. ft.
Area of Balance of Aileron, 1.6 sq. ft.
Area of Top Plane or Tail, 10.0 sq. ft.
Area of Bottom Plane of Tail, 19.2 sq. ft.
Total Area of Tail Plane, 29.2 sq. ft.
Area of Fin, 6.5 sq. ft. approx.
Area of Rudder, 6.4 sq. ft.
Area of Elevators, 22.0 sq. ft.
Horizontal Area of Body, 53.2 sq. ft.
Vertical Area of Body, 91.6 sq. ft.
Total Weight per h.p., 14.3 lbs. per h.p.
Crew, Pilot and Observer.
Armament, 1 Spandau firing through propeller.
1 Parabellum on ring mounting.
Engine, Opel Argus, 180 h.p.
Petrol Capacity, 37¼ gallons.
Oil Capacity, 3 gallons.

PERFORMANCE.

(a) Climb to 5,000 feet, 7 mins.
Rate of climb in ft. per min, 590.
Indicated air speed, 68.
Revolutions of Engine, 1,495.
(b) Climb to 10,000 ft., 18 mins.
Rate of climb in ft. per min., 340.
Indicated air speed, 65.
Revolutions of Engine, 1,475.
(c) Climb to 13,000 ft., 29 mins., 45 secs.
Rate of climb in ft. per min., 190.
Indicated air speed, 62.
Revolutions of Engine, 1,445.

SPEED.

At 10,000 ft. 96 miles an hour; Revolutions, 1,565.
At 13,000 89½ miles an hour; Revolutions, 1,520.
Service ceiling at which rate of climb is 100 ft. per min., 15,000.
Estimated absolute ceiling, 16,500.
Greatest height reached, 14,400 in 39 mins. 10 secs.
Rate of climb at this height, 120 ft. per min.
Air endurance, about 2½ hours at full speed at 10,000 ft., including climb to this height.
Military load, 545 lbs.

The machine is nose-heavy with the engine off, and slightly tail-heavy with the engine on. It tends to turn to the left with the engine on.

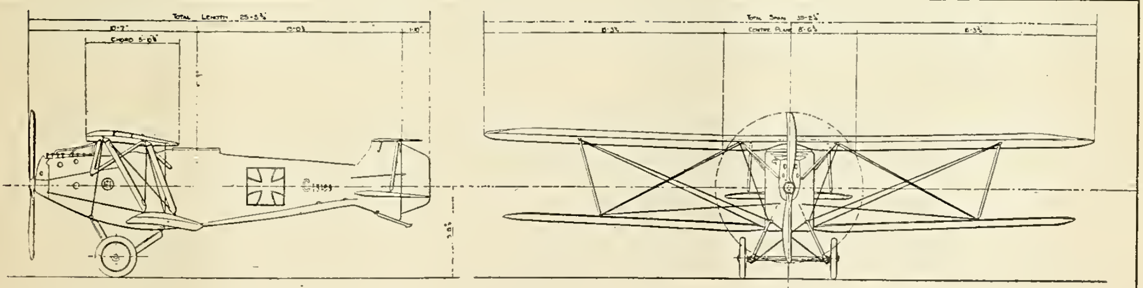
The machine is generally light on controls, except that the elevator seems rather insufficient at slow speeds. It is not very tiring to fly, and pulls up very quickly on landing.

The view is particularly good for both pilot and observer. The former sits with his eyes on a level with the top plane, and also enjoys a good view below him on account of the narrow chord of the lower plane.

The general arrangement of the Hannoveraner wings is somewhat reminiscent of the R.E.8 except, of course, that the bottom planes have no ailerons. The upper wings are practically flat in end elevation, but the lower have pronounced dihedral angles of 2.7 deg., and are set with a positive stagger of 2 ft. 7½ ins. The chord of the upper plane is 5 ft. 10¾ ins., and that of the lower plane 4 ft. 3 ins. In flying position, therefor, the trailing edge of the lower plane is slightly in advance of that of the upper plane. The angles of incidence marked on the manufacturer's rigging diagram, which is fixed to the side of the fuselage, and stamped on the fabric of the wing, are as follows:—

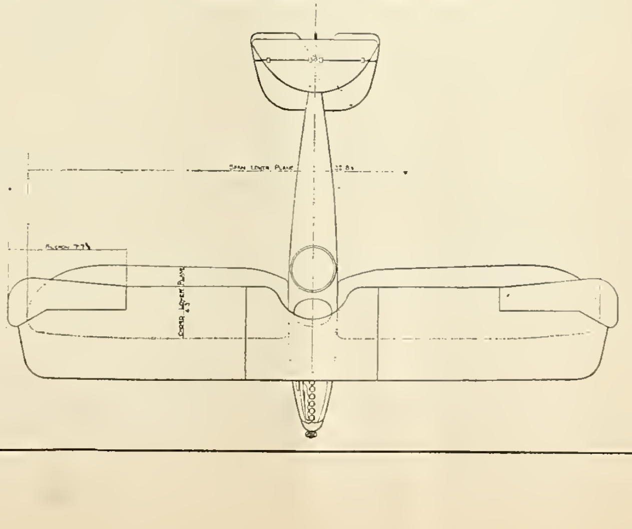
Lower Wings	5½ deg.	at fuselage.
	5 deg.	at struts.
Top Wings	5 deg.	throughout.

The lower wings are carried direct from the bottom edge of the fuselage, the roots of the upper planes being carried on a rigidly constructed centre section, which embraces the radiator and the gravity feed petrol tank. The rearward portion of the centre section is cut away immediately over the pilot's seat, and at this point the wing is about 1 ft. above the upper surface of the fuselage. The lower plane has no very pronounced wash-out, but this feature is more noticeable in the upper plane, and is enhanced by the design of the ailerons, the tips of which are set at a slightly negative angle. This gives the characteristic German appearance to the aeroplane when seen in flight.



HANNOVERANER BIPLANE.

SPAN		39′	2¼″
,, Lower Plane		36′	8½″
CHORD		5′	10¾″
GAP, ...	(about)	5′	3″
TAILPLANE SPAN ...	(Upper)	6′	9″
,, ,, ...	(Lower)	8′	0″
OVERALL LENGTH		25′	5¼″
ENGINE (Opel-Argus)		180	H.P.
PROPELLER		9′	4″
TRACK		6′	0″



TEST OF 300 H. P. MERCEDES ENGINE

(April 5, 1918)

Calibration and Endurance Tests

The Maybach engine (No. 1261) after several slight repairs had been carried out to the cylinders and propeller hub flange and coupling, was erected on a test bed, coupled to a Heenan and Froude dynamometer, and submitted to the following power and consumption tests, including a one hour's duration test at normal speed. The results of the calibration tests are as follows:

R. P. M.	1,200	1,300	1,400	1,500
B. H. P.	258	279	294.5	304.5
Brake, M. E. P.	120.5	120.3	118	113.9
Petrol consumption in pints, B. H. P. hour	.53	.52	.526	.545

One Hour Test

At the conclusion of the above tests a run of one hour's duration at normal revolutions (1,400 r.p.m) was carried out with the following results:

Average B.H.P.	290.
Petrol consumption	20 gallons = .55 pint per B.H.P. hour
Oil consumption	11 pints = .038 pint per B.H.P. hour
Oil pressure	5 lhs./sq. in.
Oil temperature	67° C.
Water temperature (inlet)	57° C.
Water temperature (outlet)	68° C.

Valve Timing During Tests

	Inlet.	Exhaust.
	O. 8°E.	O. 33°E.
	C. 35°L.	C. 7°L.
Magneto advance		38°E.

Running was steady at all speeds between 900 and 1,400 r.p.m., but owing to the fact that the propeller hub flange on the crankshaft was damaged, and was running slightly out of truth, the vibration became excessive above 1,400 r.p.m.

Considerable trouble was experienced with the water connection between the cylinders on the exhaust side. The running became unsteady below 900 r.p.m.

Distribution

Owing to the exhaust manifold being fitted as part of the engine starting gear, it was not possible to form an idea of the distribution.

F. G. C. Ap.D. (L.).
May, 1918.

J. G. Weir,
Lieutenant-Colonel,
Controller, Technical Department.

General Data

Make of engine and rated h.p.	Maybach 300 h.p.
Type number	1261.
Number and arrangement of cylinders	Six vertical.
Bore	165.0 mm. = 6.50 in.
Stroke	180.0 = 7.09 in.
Stroke/bore ratio	1.09 : 1.
Area of one piston	213.825 sq. cm. = 33.2 sq. in.
Total piston area of engine	1282.95 sq. cm. = 199.2 sq. in.
Swept volume of one cylinder	3848.85 cu. cm. = 235.3 cu. in.
Total swept volume of engine	23093.1 cu. cm. = 1412.0 cu. in.
Clearance volume of one cylinder	778.9 cu. cm. = 47.54 cu. in.
Compression ratio	5.95 : 1.
Normal b.h.p. and speed	294.0 b.h.p. at 1,400 r.p.m.
Maximum b.h.p. and speed	304.5 b.h.p. at 1,500 r.p.m.
Normal b.m.e.p.	117.7 lbs. per sq. in. at 1,400 r.p.m.
Maximum b.m.e.p.	120.5 lbs. per sq. in. at 1,200 r.p.m.
Piston speed	1654.0 ft. per min. at 1,400 r.p.m.
Mechanical efficiency (calculated)	86.0%.
Indicated mean pressure (calculated)	137.0 lbs. sq. in.
Fuel consumption per b.h.p. hour	0.526 pint = 0.473 lbs.
Brake thermal efficiency	28.9%.
Indicated thermal efficiency	33.6%.
Air standard efficiency	51.0%.
Relative efficiency	65.9%.
Cu. in, of swept volume, per b.h.p.	4.80 c. in.
Sq. in. of piston area per b.h.p.	0.678 sq. in.
H.p. per cu. ft. of swept volume	360.0 b.h.p.
H.p. per sq. ft. of piston area	212.4 b.h.p.
Direction of rotation of crankshaft.	Anti-clockwise (facing propeller)
Direction of rotation of propeller	Anti-clockwise (facing propeller)
Type of valve gear	overhead valve rocker and push rods.
Type of starting gear	Maybach of special design.
Number of carburettors	Two Maybach.
Bore of main jets	Variable from 0.0 to 2.5 mm.
Bore of pilot jets	Variable from 0.0 to 1.1 mm.
Fuel consumption per hour	19.33 gallons.

Valve Areas and Gas Velocities

Diameters	
Induction pipe	62.0 mm. = 2.44 in.
Inlet port	45 × 67 mm. = 1.77 × 2.64 in.
Exhaust port	45 × 67 mm. = 1.77 × 2.64 in.
Exhaust branch pipes	66.0 mm. = 2.60 in. (approx.).
Cross Sectional Areas.	
Induction pipe	29.26 sq. cm. = 4.67 sq. in.
Inlet port	30.15 sq. cm. = 4.67 sq. in.
Inlet valve (π dh.)	4.416 sq. in. (total).
Exhaust valve (π dh.)	4.366 sq. in. (total).
Exhaust port	30.15 sq. cm. = 4.67 sq. in.
Exhaust branch pipes	34.11 sq. cm. = 5.31 sq. in.
Gas Velocities.	
Induction pipe	196.1 ft. per sec.
Inlet port	196.1 ft. per sec.
Inlet valve	208.0 ft. per sec.
Exhaust value	210.0 ft. per sec.
Exhaust port	196.1 ft. per sec.
Exhaust branch pipes	172.5 ft. per sec.

(INLET VALVES (Two per cylinder).

Outside diameter	54.0 mm. = 2.126 in.
Port diameter (in cylinder head)	48.0 mm. = 1.89 in.
Width of seating	3.5 mm. = 0.137 in.
Angle of seating	30°
Radius under valve head	20.0 mm. = 0.787 in.
Lift of valve	9.45 mm. = 0.372 in.
Diameter of stem	11.0 mm. = 0.433 in.
Over-all length of valve	136.5 mm. = 5.373 in.
Number of springs per valve	One.
Free length of spring	52.5 mm. = 2.066 in.
Length of spring in position (no lift)	39.5 mm. = 1.55 in.
Mean diameter of coils	51.0 mm. = 2.00 in.

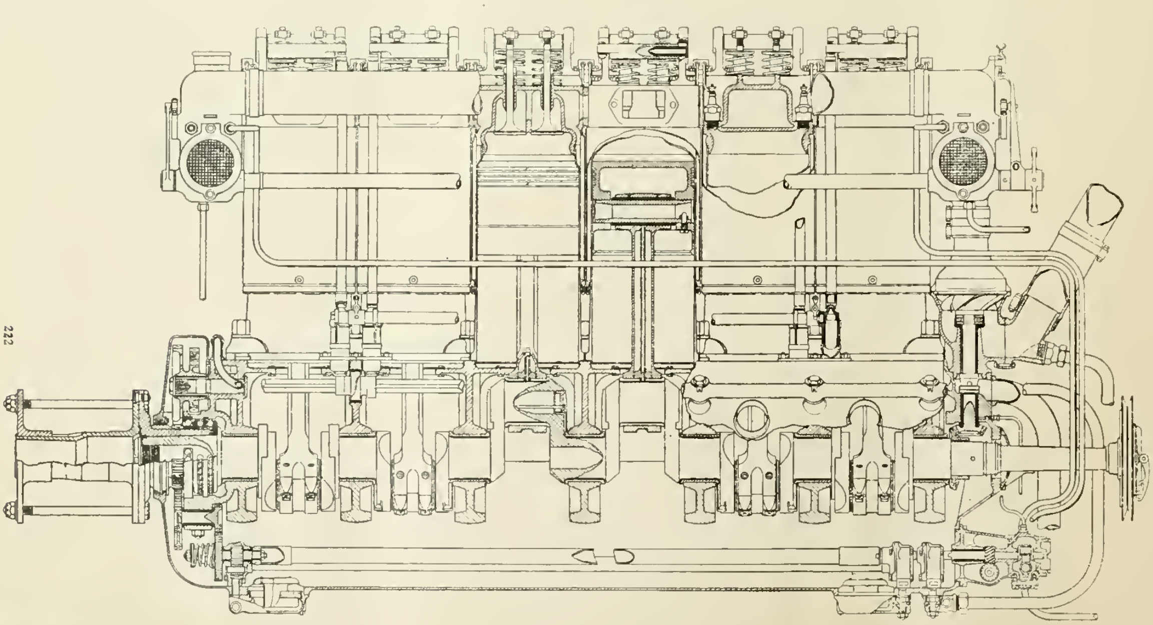


Fig 49
GENERAL SECTIONAL ARRANGEMENT OF THE 300 h p. MAYBACH ENGINE

Gauge of wire	No. 6 b.w.g.
Ratio length of spring/lift of valve	4.17 : 1.
Weight of valve complete with spring	0.843 lb.
Weight of spring bare	0.281 lb.
Inlet valve opens, deg. on crank	8° early.
Inlet valve closes, deg. on crank	35° late.
Period of induction	223°
Inlet tappet clearance	0.3 mm. = 0.012 in.

Connecting Rod

Length between centres	310.0 mm. = 12.205 in.
Ratio. Connecting rod/crank throw	3.44 : 1.
Little end bearing type	Floating cast-iron bush.
Floating bush, diameter, inside	38.0 mm. = 1.496 in.
Floating bush, diameter, outside	44.3 mm. = 1.743 in.
Floating bush, effective length inside	93.0 mm. = 3.661 in.
Floating bush, projected area of bearing on gudgeon pin	35.35 sq. cm. = 5.48 sq. in.
Ratio. Piston area/projected area of little end bearing	6.06 : 1.
Big end bearing. Type	Bronze shell lined white metal.
Big end bearing. Diameter	66.0 mm. = 2.598 in.
Big end bearing. Length (actual)	73.56 mm. = 2.893 in.
Big end bearing. Length (effective)	65.5 mm. = 2.580 in.
Big end bearing. Projected area	43.23 sq. cm. = 6.700 sq. in.
Ratio. Piston area/projected area of big end bearing	4.96 : 1.
Number of big end bolts	Four.
Full diameter of bolts	14.0 mm. = 0.551 in.
Diameter at bottom of threads	12.0 mm. = 0.472 in.
Total cross sectional area, bottom of threads	4.520 sq. cm. = 0.70 sq. in.
Pitch of threads	1.5 mm.
Total load on bolts at 1,400 r.p.m.	5,824 lbs.
Total load on bolts at 1,600 r.p.m.	7,602 lbs.
Stress per sq. in. at 1,400 r.p.m.	8,320 lbs. sq. in.
Stress per sq. in. at 1,600 r.p.m.	10,860 lbs. sq. in.

Crankshaft

Number and type of main bearings	Seven bronze shell lined white metal.
Cylinder centres	187.0 mm = 7.362 in.
Crank-pins.	
Outside diameter	66.00 mm. = 2.598 in.
Inside diameter	38.0 mm. = 1.496 in.
Length	74.0 mm. = 2.913 in.
Journals.	
Outside diameter	66.0 mm. = 2.598 in.
Inside diameter	36.0 mm. = 1.417 in.
Length, propeller end	67.0 mm. = 2.638 in.
Length, rear end	67.0 mm. = 2.638 in.
Length, centre	67.0 mm. = 2.638 in.
Length, intermediate	67.0 mm. = 2.638 in.
Crank Webs.	
Width	95.0 mm. = 3.740 in.
Thickness	23.0 mm. = 0.906 in.
Radius at ends of journals and crank-pins	4.5 mm. = 0.171 in.
Weight of complete shaft	99.9 lbs.

Working Clearances

Piston clearance, top (total)	0.75 mm. = 0.029 in.
Piston clearance, bottom (total)	0.25 mm. = 0.009 in.
Side clearance of connecting rod in piston (total)	11.8 mm. = 0.464 in.
Side clearance of big end on crank-pin (total)	0.44 mm. = 0.0173 in.
End clearance of crankshaft in main bearings	3.0 mm. = 0.118 in.
Clearance of valve stem in guide (inlet)	0.12 mm.= 0.00472 in.
Clearance of valve stem in guide (exhaust)	0.15 mm.= 0.0059 in.

Lubrication System

Number and type of oil pumps	Three, rotary gear.
Oil consumption per hour	11.0 pints.
Oil consumption per b.h.p. hour	0.037 pints.
Oil temperature	65° Centigrade.
Oil pressure	5.0 lbs. per sq. in.
Specific gravity of oil	0.899 s.p.g.
Ratio. Pump speed/crankshaft speed	1 : 2.
Pump delivery (calculated at 100% volumetric efficiency)	91 gallons per hour at normal engine revs.

Ignition

Number and type of magnetos	Two Bosch.
Firing sequence of engine	1-5-3-6-2-4.
Ignition timing (fully advanced)	38° early.
Number of plugs per cylinder	Two.
Type of plugs	Bosch 3 point.
Ratio. Magneto speed/engine speed	1.5 : 1.

Cooling System

Number and type of water pumps	One centrifugal.
Diameter of inlet pipe	54.0 mm. = 2.126 in.
Diameter of outlet pipe	50.0 mm. = 1.966 in.
Diameter of rotor	111.0 mm. = 4.36 in.
Water capacity of one cylinder	1284.0 cu. cm.
Number and type of radiators	One, semi-circular honeycomb.
Ratio. Water pump speed/engine speed	2 : 1.
Water temperature, inlet	57° Centigrade.
Water temperature, outlet	68° Centigrade.

Petrol Pump

Number and type of petrol pumps	One Maybach, double acting.
Bore	15.0 mm. = 0.59 in.
Stroke	17 mm. = 0.66 in.
Normal delivery	264 pints per hour at 800 r.p.m.
Maximum delivery	630 pints per hour at 1,275 r.p.m.
Ratio. Pump speed/crankshaft speed	1 : 2.

Weights

Weight of complete engine, dry, with propeller boss and exhaust manifold	911 lbs.
Weight per b.h.p., ditto	3.10 lbs.
Weight of fuel per hour	139 lbs.
Weight of oil per hour (s.p.g. o.899)	12.36 lbs.
Total weight of fuel and oil per hour	151.36 lbs.
Gross weight of engine in running order, less fuel and oil (cooling system at 0.65 lbs. per b.h.p.)	1102.0 lbs.
Weight per b.h.p., ditto	3.79 lbs.
Gross weight of engine in running order, with fuel and oil for six hours (tankage at 10% weight of fuel and oil)	2100.9 lbs.
Weight per b.h.p., ditto	7.14 lbs.

General Analysis of Weights

Description of Part	No. per set	Average unit in lbs.	Weight of complete set in lbs.	Percentage of total weight
Cylinders, bare	6	32.75	196.50	21.59
Pistons, complete with rings and gudgeon pin set screws	6	12.30	73.80	8.11
Gudgeon pins	6	1.75	10.50	1.15
Connecting rods and floating bushes	6	8.93	49.12	5.39
Crankshaft, complete with oil rings	1	99.90	99.90	10.98
Crankshaft extension, with nut and pin	1	4.00	4.00	0.44
Inlet valves	12	0.43	5.25	0.57
Exhaust valves	12	0.47	5.70	0.62
Inlet and exhaust valve springs	24	0.28	6.74	0.74
Inlet and exhaust valve collars, with cotters and locking device	24	0.12	3.00	0.32
Thrust, complete with bull races, propeller hub flange, and camshaft driving sprocket	1	17.68	17.68	1.94
Camshafts	2	10.00	20.00	2.20
Overhead valve rockets, complete	12	1.08	12.99	1.42
Overhead rocker bearings, complete	24	0.42	10.50	1.15
Valve tappets and guides	12	0.93	11.25	1.23
Crankcase, top half	1	94.30	94.30	10.36
Crankcase, bottom half	1	41.32	41.32	4.54
Bearing caps	6	2.68	16.12	1.77
Front bearing cap	1	5.56	5.56	0.61
Crankcase holding-down bolts, with clamps, nuts and washers	14	2.40	33.60	3.70
Induction pipe, complete	1	9.09	9.09	1.00
Propeller hub, with bolts and nuts	1	21.00	21.00	2.30
Inlet valve push rods	6	0.48	2.90	0.32
Exhaust valve push rods	6	0.49	2.97	0.33
Inlet and exhaust stiffening plates	2	2.00	4.00	0.44
Oil pumps, with drive and pipe	1	9.00	9.00	0.98
Rear cover plate	1	6.06	6.06	0.66
Front cover plate	1	4.00	4.00	0.44
Water pump, complete	1	8.50	8.50	0.93
Camshaft, oil and water pumps driving gears	1	13.65	13.65	1.50
Wireless clutch	1	5.06	5.06	0.55
Revolution counter gear	1	2.62	2.62	0.28
Machine gun interrupter gear	1	1.82	1.82	0.20
Petrol pump	1	3.50	3.50	0.38
Magnetos	2	10.75	21.50	2.36
Magneto wiring	1	4.75	4.75	0.52
Oil pipes	1	4.00	4.00	0.44
Self-starter gear	1	6.00	6.00	0.66
Exhaust manifold	1	27.00	27.00	2.96
Carburettors	2	16.00	32.00	3.51
Miscellaneous	—	—	3.75	0.41
Total weight of engine	—	—	911.00	100.00

Metallurgical Analysis of Principal Parts

	Carbon per cent.	Graphite Carbon per cent.	Combined Carbon per cent.	Silicon per cent.	Manganese per cent.	Sulphur per cent.	Phosphorus per cent.	Nickel	Chromium per cent.
Cylinder head	—	2.57	0.91	1.60	0.70	0.131	0.34	—	—
Cylinder barrel	0.49	—	—	0.33	1.01	0.028	0.054	—	—
Cylinder water jacket	0.25	—	—	0.27	0.63	0.032	0.037	—	—
Piston	—	2.42	0.83	1.29	0.83	0.111	0.30	—	—
Gudgeon pin floating bush	—	2.39	0.65	1.43	0.76	0.146	0.47	—	—
Gudgeon pin	0.28	—	—	0.23	0.48	0.028	0.022	—	—
Connecting rod	0.15	—	—	0.33	0.31	0.027	0.010	1.42	0.49
Inlet valve	0.53	—	—	0.30	0.48	0.032	0.044	4.01	0.51
Exhaust valve	0.10	—	—	0.20	0.26	0.019	0.023	3.62	1.16
Crankshaft	0.31	—	—	0.31	0.63	0.030	0.015	4.01	0.83
Camshaft	0.40	—	—	0.25	0.23	0.022	0.040	3.46	0.68
Camcore	0.17	—	—	0.23	0.75	0.036	0.014	0.47	—

	Lead per cent.	Iron per cent.	Tin per cent.	Copper per cent.	Zinc per cent.	Antimony per cent.	Silicon per cent.	Manganese per cent.
Big-end bearing metal	3.51	—	80.05	6.34	—	9.90	—	—
Main journal bearing	0.92	—	77.65	10.00	—	11.18	—	—
Crankcase	—	0.99	—	0.87	12.01	Aluminum (by Diff) 86.57	0.56	trace

CAPTAIN SCHROEDER ESTABLISHES WORLD ALTITUDE RECORD

THE Contest Committee of the Aero Club of America has homologated the world's altitude record made by Captain R. W. Schroeder, in a Bristol fighter equipped with 300 H. P. Hispano-Suiza motor, of 28,900 feet above sea level, during a flight on September 18, 1918, at Wilbur Wright Field, Fairfield, Ohio, near Dayton.

Nothing was more fitting. While the Allies' aviators overseas are beating the Germans on the various fronts, an American aviator, Captain R. W. Schroeder, U. S. Air Service, beats the German aeroplane altitude record.

Captain Schroeder left the ground at 1:45 P. M., September 18, 1918, and reached his highest point in 105 minutes, which would have been at about 3:30 P. M. It took him about twenty minutes to descend, landing about 200 miles from where he started, at about 3:50 P. M.

Captain Schroeder is in charge of all Performance Tests at the Wilbur Wright Station and his duties require him to go to 21,000 and 22,000 feet quite often, and he generally goes without oxygen. In this record climb, he got along well up to 25,000 feet without oxygen. He used no anti-freezing mixture and his maximum water temperature was 85 degrees centigrade at the start minimum and of 60 degrees centigrade at the highest altitude. The temperature of the air was 32 degrees centigrade below zero.

The reports, including the two barograph charts, duly calibrated and corrected; the performance curves, and the temperature record were certified to by Lieut. George B. Patterson, O. I. C. Performance Tests Reports and the instruments were calibrated by the Bureau of Standards, and adjusted locally at the McCook Field Laboratory and personally installed on the aeroplane by Lieut. Patterson.

The previous American altitude record was made by Caleb Bragg at Mineola, L. I., September 20, 1917, in a Wright Martin, Model V machine, when he reached the altitude of 20,250 feet, and the last world's record of the International Aeronautic Federation made by G. Legagneux in France on the 28th of December, 1913, was 6,120 meters (20,258 feet). In July, 1914, a German aviator was reported as having flown to 26,200 feet, but the record was never submitted for homologation.

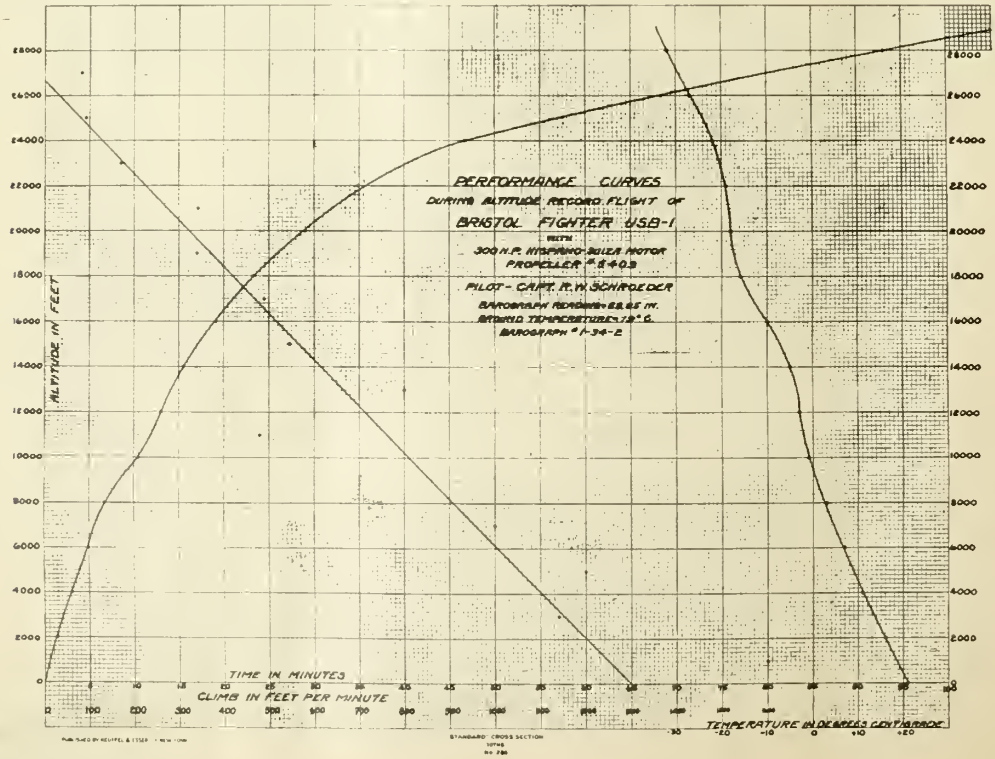
This world's record, made by Captain Ruddy W. Schroeder, is the first world's aeroplane altitude record held by an American since the world's altitude record made by Lincoln Beachey, at Chicago, Ill., during the International Meet, August 20, 1911, when he reached the height of 11,642 feet (3,548 meters).

Under the rules of the International Aeronautic Federation, the international aeronautic body which controls all aeronautic sports and gives the necessary official recognition to records, a pilot must hold the International Aviator's certificate to have his record recognized. This certificate is issued in the United States by the Aero Club of America, which is the Federation's sole representative in this country. Captain Schroeder held the F. A. I. certificate at the time he made the record, therefore his record will be accepted by all the countries affiliated with the International Aeronautic Federation and the Pan-American Aeronautic Federation, which represents the twenty Latin-American republics.

Under the rules of the Federation to establish an altitude record it is necessary to beat the old record by at least 100 meters. Captain Schroeder, therefore, beat the record by a good margin and has gone higher than the highest of mountains, with the exception of the highest peak of the Himalaya, which rises to 29,002 feet.

Captain Schroeder is a veteran in the aeronautic movement. He is an old time member of the Aero Club of Illinois and well known for his ability as an aviator and aeronautic engineer.

Capt. R. W. Schroeder who made the new altitude record



Hon. Albert S. Burleson, Postmaster General
Hon. Otto Praeger, Second Assistant Postmaster General
Captain Benjamin B. Lipsner, Superintendent Aerial Mail Division

AERIAL MAIL PILOTS

- Max Miller
- Maurice A. Newton
- Robert Shank
- Ed. V. Gardner
- C. D. De Hart
- Louis Gertson
- R. Smith

AERIAL MAIL MECHANICS

- Henry Wacker
- E. N. Angle
- A. F. Cryder
- Ed. C. Radel
- Wm. C. Read
- W. O. Beatty
- Chas. King
- J. A. Danville

George Langley Conner, Chief Clerk to Second Assistant Postmaster Praeger
Charles M. Kight, Special Representative
John A. Jordan, Special Representative
Frank Bowie, College Park, Md., Representative
Harry L. Hartung, Belmont Park, L. I., N. Y., Representative
H. Thomas, Bustleton, Penn., Representative

Aero Mail Scores 100% for September

The record of the Air Mail Service between Washington, Philadelphia and New York for the month of Septemher was 100% perfect.

The operation of the aeroplanes, constructed for the Post Office Department, hy civilian pilots of the postal service was inaugurated August 12. The record of all the flights from this date to the first of Septemher, except two, was 100% perfect, the score of two flights being reduced to 99% hy reason of forced landings.

The Septemher report covers the first full month of operation under entirely civilian organization, and the round trip flight was made each day without a break in the service. The distance covered by these flights was 11,351 miles; the total time consumed 156 hours and 9 minutes, and the total weight of mail carried was 15,199 lbs.

During the month there were but three forced landings and these were not such as to interrupt the flights.

AERIAL MAIL OPERATION FOR THE MONTH OF SEPTEMBER, 1918

Date	*Miles flown*	*Hrs. of flying*		*Mail carried*		*Percent of Performance*	*Arrival*	
		hrs.	*min.*	*A.*	*O.*		*Wash.*	*N. Y.*
Sept.	1.	2.		3.		4.	5.	
2	436	5	29	27	515	100%	2.44	2.40
3	436	5	30	31½	580	100%	3.15	2.15
4	436	5	39	39½	617	100%	3.10	2.20
5	436	6	11	36	581	100%	4.00	2.08
6	436	5	35	35	608	100%	3.05	2.35
7	436	5	37	35	589	100%	3.18	2.18
9	436	5	51	48½	562	100%	2.47	2.59
10	436	6	03	38½	585	100%	3.05	2.48
11	436	5	50	36	573	100%	2.36	3.04
12	436	5	45	35½	603	100%	3.05	2.27
13	436	5	13	34	559	100%	3.05	2.05
14	436	6	22	34	558	100%	4.00	2.15
16	436	6	11	33½	582	100%	4.05	2.00
17	436	5	26	35	482	100%	3.30	1.50
18	436	7	11	39½	444	100%	7.30	2.50
19	436	6	06	35	608	100%	4.05	1.53
20	436	6	29	33	574	100%	3.50	3.12
21	444	6	04	31	618	100%	5.00	2.30
23	436	5	48	34½	566	100%	3.05	2.44
24	436	6	17	36½	575	100%	3.31	3.30
25	436	6	41	31	361	100%	4.31	2.37
26	654	9	03	34¼	771½	100%	4.10	2.39
27	661	9	25	32½	857½	100%	3.42	2.42
28	436	6	41	34½	589	100%	5.05	1.48
30	436	5	42	34	367	100%	3.08	2.42
Total	11,351	156	09	874¾	14,325			

Note—Number of hours of dead flying for the month, 14 hrs., 40 min.

Explanation of Tabulation:

1. *Miles flown:*

Leg from Washington to Philadelphia	128 miles
Leg from Philadelphia to New York	90 miles

Miles flown for the day; whether one,two, three or four legs of the trip have been made. The aim is to get exactly the number of miles flown in connection with the mail service each day. Therefore, mileage of partial trips should be indicated.

2. *Hours of flying:* To include the actual hours and minutes machine is in the air with mail.
3. *Mail carried:* In this column, under A, give pounds of aeroplane mail; and under O, give pounds of ordinary mail.
4. *Percent of Performance:* Round trip Washington-New York consists of four legs, each leg valued at 25% if completed by aeroplane and not by train before close of day.

PERFORMANCE OF AVIATORS DURING THE MONTH OF SEPTEMBER, 1918.

Total possible number of flights	100
Total possilbe mileage	10,900
Total perfect (uninterrupted) flights made	97
Total interrupted flights made	3
Total flights defaulted on account of weather	0

Pilot	*Perfect Flights*		*Forced Landings*		*Total Flights*	
	No.	*Miles*	*Interrupted Flights*	*Uncompleted Flights*	*No*	*Miles*
Dana C. DeHart	32	4388	2 (a)	0	34	3706
Robert F. Shank	33	3616	1 (b)	0	34	3706
Maurice A. Newton	30	3270	0	0	30	3270
Max Miller	2	218	0	0	2	218
Total	97	10,592	3	0	100	10,900

Cause of Forced Landings:

(a) DeHart, September 18th, compass disturbances in storm; September 21st, ignition trouble.

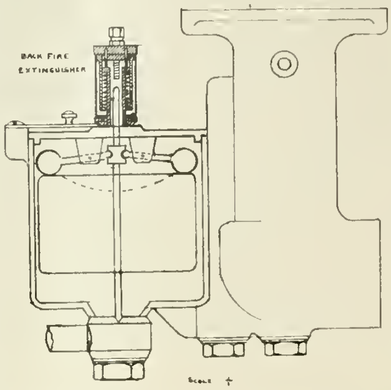
(b) Shank, September 24th, water-system trouble.

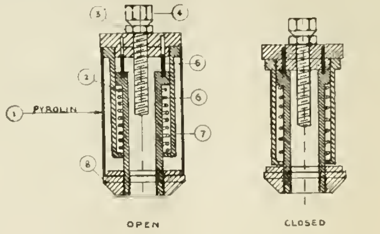
A BACK-FIRE EXTINGUISHER

MR. HAROLD SUCKERT, a well-known carburetor expert and engineer, has designed the Back-fire Extinguisher shown in the accompanying sketches and plates.

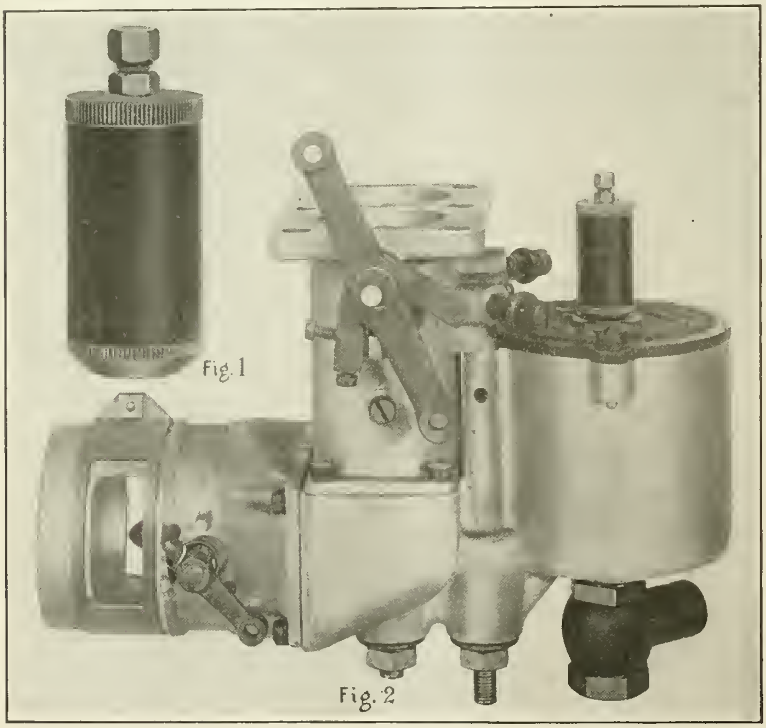
While it is not claimed that it will prevent back fires, which are unavoidable, it is claimed and has been demonstrated, that this simple device will shut off the gasoline from the tank, the moment a back fire sets fire to the carburetor, thus making possible the prevention of serious accidents. The device can be attached to any type of carburetor, either on aeroplanes, automobiles or motor boats, its action is as follows:

It is screwed on the top of the carburetor float chamber, directly over the intake needle valve, which extends up into the body of the device, within an eighth of an inch of the bottom of the adjustable rod No. 4, which is carried by the plunger No. 7. The spring No. 2, which is under compression, surrounds the plunger guide No. 6, which screws onto the top of the carburetor float chamber. This spring is kept under compression by a highly inflammable perforated collar of Pyrolin, which flashes instantly on coming into contact with any flame. This immediately releases the tension on the spring, which causes the plunger No. 7 to seat on the base No. 8, thus forcing the intake needle valve firmly against its seat, shutting off all flow of gasoline from the tank.





No	Name of Part	Material	No	Name of Part	Material
1	Inflammable Material	Pyrolin	5	Guide Pins	Steel
2	Spring	Steel	6	Plunger Guide	Brass
3	Lock Nut	Brass	7	Plunger	Brass
4	Adjustment Nut	Brass	8	Base	Brass



It is a well-known fact that any contingency which causes the motor to race, such as a broken propeller blade or particularly rarified strata of air, draws the fuel out of the float chamber faster than it can be supplied. This invariably causes a back fire, due to too thin a mixture. When this occurs, the float is usually down, and the gas line fully open. The gasoline under pressure is forced into the flame, and this usually spells disaster.

The Back-fire Extinguisher does automatically what the operator is supposed to do manually, shuts off the supply from the tank.

This does not necessarily put the engine out of commission as there is a connection to the dash board which permits the driver to immediately raise the device to its original position, and continue his flight.

A supply of Pyrolin collars is furnished with each device. The Back-fire Extinguisher is controlled by W. H. de Fontaine of 1697 Broadway, New York, formerly President of the H and N Carburetor Company, who has offered it to the United States Government and her Allies.

THIRD ANNUAL REPORT OF THE NATIONAL ADVISORY COMMITTEE ON AERONAUTICS

Physical Problems

(Concluded from page 175)

BESIDE the more general problems, the following problems of a physical, rather than an aeronautical nature, are of particular interest, and under same the following progress is noted:

A. *Noncorrosive materials.*—For the production of iron and steel, investigations of zinc coatings produced by the hot dip, sherardizing, and electroplating processes have been carried on at the Bureau of Standards. Investigations are under way to determine the relative resistance to corrosion by these processes and also the effect on the physical properties of steel as influenced by such processes. Various methods of testing these products as by accelerated tests, such as the salt-spray test, measurements of thickness and quantity of coating are being studied to develop adequate specifications for these materials.

Some work has also been done in connection with the following additional rust-proof processes: Copper and nickel plating; Parker process (which consists in treating with phosphoric acid and final oiling); the magnetic oxide coating such as Bon Tempi process, which may or may not be oiled; lead coating as produced by the Lohman hot-dip process; tin coating; metallic coatings produced by the metal-spraying process; inert coating, such as paint, japan, and baked enamels.

The great variation in thickness and weight of the metallic coatings produced under commercial conditions are such as to make it difficult if not impossible to determine their value by these measurements alone. Some standard accelerated corrosion tests are therefore necessary before uniformly protected coatings can be specified.

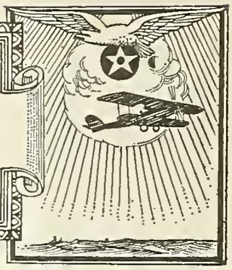
B. *Flat and cambered surfaces.*—The committee has obtained reports of several tests conducted at the National Physical Laboratory of Great Britain, which contain valuable information on stabilizers, elevators, and rudders.

Accurate data can be obtained from Report No. 17, previously referred to, as to variations to be made in tail surfaces, viz: size; position, both longitudinal and vertical; angles of tail plane to wing; aspect ratio; and sections, flat and cambered.

C. *Terminal connections.* — Tests have been made on two forms of terminal connection, one a sleeve allowing the forming of a solderless loop and the other a turnbuckle by means of which a cable or wire may be loosened without unscrewing the turnbuckle barrel. The tests thus far are not

(Continued on page 239)

NAVAL *and* MILITARY AERONAUTICS



Key to Abbreviations

AAD—Assigned to active duty.
ABC—Report to Army Balloon School, Arcadia, Cal.
ADO—Report to Aviation Supply Depot, Dayton, Ohio.
ADT—Report to Aviation Supply Depot, Dallas, Texas.
AFO—Report to Aviation Supply Depot, Fairfield, O.
AGC—Report to Aviation Supply Depot, Garden City, L. I., N. Y.
AHT—Report to Aerial Gunnery School, Houston, Texas.
AIR—Transferred to the Air Service, National Army, without change in rank or date of commission.
ALF—Report to Camp Alfred Vail, Little Silver, N. J.
AMV—Report to Aviation General Supply Depot, Morrison, Va.
AOV—Report to School for Aerial Observers, Hampton, Va.
APR—Report to School of Aerial Photography, Rochester, N. Y.
ARV—Report to Aviation Supply Depot, Richmond, Va.
ASM—Report to Aviation Mechanics' Training School, St. Paul, Minn.
BFT—Report to Barron Field, Fort Worth, Texas.
BRN—Report to Bakers Field, Rochester, N. Y.
BST—Report to Brooks Field, San Antonio, Tex.
CAF—Report to Carlstrom Field, Arcadia, Fla.
CAP—Commissioned as Captain, Aviation Section, Signal Corps.
CDT—Report to Aviation Concentration Camp, Dallas, Texas.
CFT—Report to Carruthers Field, Fort Worth, Texas.
CGC—Report to Aviation Concentration Camp, Garden City, L. I., N. Y.
CGS—Report to Aviation Concentration Camp, Greenville, S. C.
CIT—Report to Radio School, Carnegie Institute of Technology, Pittsburgh, Pa.
CJS—Report to Camp Jackson, Columbia, S. C.
CJW—Report to Camp John Wise, San Antonio, Texas.
CLR—Commissioned as Colonel, Aviation Section, Signal Reserve Corps.
CMV—Report to Aviation Concentration Camp, Morrison, Va.
CPA—Commissioned as Captain Air Service, National Army.
CPR—Commissioned as Captain, Aviation Section, Signal Reserve Corps.
CRI—Report to Chanute Field, Rantoul, Ill.
CSO—Report to the Chief Signal Officer, Washington, D. C.
CUI—Report to School of Military Aeronautics, Cornell University, Ithaca, N. Y.
CWT—Report to Call Field, Wichita Falls, Texas
DAF—Report to Dorr Field, Arcadia, Fla.
DAP—Report to Director of Aircraft Production, Washington, D. C.
DIK—Report to Camp Dick, Dallas. Tex.
DIS—Honorably discharged from service.
DMA—Report to Director of Military Aeronautics, Washington, D. C.
ELA—Report to Eberts Field, Loanoke, Ark.
EOT—Report to Ellington Field, Olcott, Texas.
FLA—Commissioned as First Lieutenant Air Service, National Army.
FLR—Commissioned as First Lieutenant, Aviation Section, Signal Reserve Corps.
FLT—Commissioned as First Lieutenant, Aviation Section, Signal Corps.
FOB—Report to Fort Omaha Balloon School, Omaha, Neb.
FRF—On duty requiring regular and frequent aerial flights.
FSO—Report to Fort Sill School for Aerial Observers, Fort Sill, Okla.
GIT—Report to School of Military Aeronautics, Georgia Institute of Technology, Augusta, Ga.
GLC—Report to Gerstner Field, Lake Charles, La.
HHN—Report to Hazelhurst Field, Mineola, L. I., N. Y.
JMA—Rated as Junior Military Aviator.
JRC—Report to Jackson Field, Riverside, Cal.
KST—Report to Kelly Field, So. San Antonio, Tex. (When specified in the order, the number of the field is given in parentheses)
LDT—Report to Love Field, Dallas, Tex.
LHV—Report to Langley Field, Hampton, Va.
MAC—Report to March Field, Allesandro, Cal.
MAJ—Commissioned as Major, Aviation Section, Signal Corps.
MAT—Report to Mather Field, Sacramento, Cal.
MDO—Report to McCook Field, Dayton, Ohio.
MIT—Report to School of Military Aeronautics, Massachusetts Institute of Technology, Boston, Mass.
MJA—Commissioned as Major Air Service, National Army.
MJR—Commissioned as Major, Aviation Section, Signal Reserve Corps.
MSC—Report to Radio School, Maryland State Agricultural College, College Park, Md.
OBS—Attached to the Aeronautical Service as Observers.
OSU—Report to School of Military Aeronautics, Ohio State University, Columbus, Ohio.
PFO—Report to Post Field, Fort Sill, Okla.
PMT—Report to Park Field, Millington, Tenn.
PUP—Report to School of Military Aeronautics, Princeton University, Princeton, N. J.
PWM—Report to Payne Field, West Point, Miss.
REL—Relieved from present duty.
RSD—Report to Rockwell Field, San Diego, Cal.
RTR—Retransferred to organization attached to previous assignment to aviation duty.
RWT—Report to Rich Field, Waco, Tex.
SBI—Report to Scott Field, Belleville, Ill.
SAG—Report to Souther Field, Americus, Ga.
SGS—Report to Camp Sevier, Greenville, S. C.
SLA—Commissioned as Second Lieutenant Air Service, National Army.
SLR—Commissioned as Second Lieutenant, Aviation Section, Signal Reserve Corps.
SLT—Commissioned as Second Lieutenant, Aviation Section, Signal Corps.
SMM—Report to Selfridge Field, Mount Clemens, Mich.
SRC—Report to Columbia School for Radio Officers, New York City.
TFT—Report to Taliaferro Field, Fort Worth, Texas. (When specified in the order, the number of the field is given in parentheses)
TMA—Report to Taylor Field, Montgomery, Ala.
UCB—Report to School of Military Aeronautics, University of California, Berkeley, Cal.
UIU—Report to School of Military Aeronautics, University of Illinois, Urbana, Ill.
UTA—Report to School of Military Aeronautics, University of Texas, Austin, Tex.
VBW—Report to Vancouver Barracks, Washington.
WAC—Report to Aviation Concentration Camp, Waco, Tex.
WCS—Wire to the Chief Signal Officer upon arrival.
WDM—Wire, Director of Military Aeronautics, upon arrival.
WFO—Report to Wilhur Wright Field, Fairfield, Ohio.

Notes

Note 1—Report to places mentioned in order named for temporary duty.

Note 2—Report to Students' Army Training School, Univ. of Ark., Fayetteville, Ark.

Note 3—Report to Students' Army Training School, Valparaiso Unit., Valparaiso, Ind.

Note 4—Report to Students' Army Training School, Purdue Univ., Lafayette, Ind.

Note 5—Report to Students' Army Training School, Univ. of Me., Orono, Maine.

Note 6—Report to Students' Army Training School, Iowa State College, Ames, Iowa.

Note 7—Report to Students' Army Training School, Univ. of Cinn., Cincinnati, Ohio.

Note 8—Report to Students' Army Training School, Carnegie Tech., Pittsburgh, Pa.

Note 9—Report to Students' Army Training School, Boston College, Boston, Mass.

Note 10—Report to Students' Army Training School, Ind. Chamber of Commerce, Indianapolis, Ind.

Note 11—Report to Aviation Repair Depot, Indianapolis, Ind.

Note 12—Report to Dis. Mgr. Finance, Yeon Bldg., Portland, Ore.

Note 13—Report to Aviation Gen. Supply Depot, Middletown, Pa.

Note 14—Report to Acceptance Park, Detroit, Mich. Wire DAP.

Note 15—Report to Chief Technical Division, Dayton, O.

Note 16—Report to Production Dept., Saving and Trust Bldg., Dayton, O.

Note 17—Report to Dis. Mgr., 480 Lexington Ave., New York City.

Note 18—Report to Dis. Mgr., Aircraft Production, Dayton, O.

Special Orders Nos. 215-221, Inclusive

A

Arthur, Ira W.	SLA; BFT
Abhey, Evers	SLA; CUI
Ault, Leo V.	CUI
Allen, Harold Draper	SLA; CJW
Alexander, Robert P.	PMT
A'Hearn, Clarence Joseph	SLA; KST
Andrews, Howard Milo	KST
Andrews, Harold W.	SLA
Andrews, Elmer Frank	SLA; SAG
Andrews, Lloyd James	SLA; CFT
Andrews, Howard B.	FLA
Adams, Alfred Azel	FLA
Allen, Porter W.	WFO
Ayres, Stanley Wrightman	SLA; CFT
Austin, Edward Cowles	SLA; RWT
Atkinson, William T.	RWT
Athey, Gerald Browne	CWT
Avent, Ira M.	EOT
Allison, Ernest M.	SBI
Aehle, Truman H.	CGC
Alway, James Douglas	PWM

B

Brown, Mays Priest	SLA; TMA
Berens, Fred W.	FRF
Beymer, Harold Scoville	SLA; ELA
Born, Jacoh	SLA; CWT
Butler, Lawrence Otis	SLA; BFT
Bradley, Timothy W.	TFT
Barnes, Gerald Kneedy	SLA; ABC
Burnham, Stanley	ABC
Bailey, Elmer Samuel	FLA
Bocker, Leon Morris	FLA
Bradford, Harry Alonzo	FLA
Brang, Raymond L.	FLA
Beggs, Joseph D.	CGC
Benedict, Frank Griffith	SLA; GLC
Butler, Frederick W.	TFT
Brawley, William Foote	SLA; CWT
Buck, Carl Edward	SLA; KST
Brown, Warren D.	CGC
Burbank, Wayne	SLA; ABC
Bishop, Joseph Alfred	SLA; TMA
Bowe, Charles James	SLA; GLC
Blair, Edward	CUI
Brown, Alhert S.	TFT
Bourne, Granville H.	DAP
Bushman, Francis Lawrence	SLA; TMA
Brown, Homer	SLA; BFT
Buck, Robert Wales	SLA; VBW
Billings, John Shaw	SLA; CRI
Brown, Edward Tilden	SLA; CWT
Browne, Rohert E.	TFT
Boggs, Harry Ariail	SLA; SAG
Bushnell, Sherman W.	ASM
Bankart, Lawrence Hardy	FLA; HHN
Budd, Thomas Gallaudet	SLA; SAG
Brockway, George Glen	SLA; PMT
Blair, Frank Williamson	CWT
Benvie, Frank William	CWT
Bell, Harry Smith	CWT
Brodd, Earl Frederick	CWT
Boggs, Paul Raymond	CWT
Bridgman, Orlando Wilson	CWT
Beattie, Harold Goldsmith	SLA; PMT
Birnn, Roland	WFO
Banta, George Henry	SLA; CFT
Brown, Courtlandt Moshier	SLA; CJW
Boyden, William Edward	SLA; PMT
Brock, Harry	SLA; TMA

Bullock, Wiley O	WFO
Brown, Ray Walter	SLA; GLC
Brown, Albert Skillman	SLA; KST
Brown, Edward T	WFO
Beverley, George H	SAG
Billig, Hal C	SAG
Blackler, Perry W	SAG
Bronez, Frank Louis, Jr	SLA; ELA
Burge, Kemp S	LHV
Bennett, Thomas Edmund	SLA; KST
Buster, Melvin Wright	TMA
Bachelder, Harold K	UTA
Buckley, James Whitcomb	SLA; KST
Bates, Richard Jacob	SLA; VBW
Berg, Lawrence Fabian	SLA; CWT
Beecher, John F	LHV
Barnard, Albert	RWT
Burke, William J	RWT
Burger, Valentine Joseph	SLA
Bailey, Raymond L	SAG
Boyd, George W	SAG
Block, Kenwood M	WFO
Bell, Robert Maxwell	SLA; CWT
Baker, Russell I	WFO
Bissonnet, George H	WFO
Bailey, James Ruskin	CAF
Baker, Robert L	CGC
Burton, Charles H	PWM
Behse, Joseph E	PWM
Blevins, Beeler B	PWM
Beehler, Charles H	CGC
Bunn, James H	CGC
Baker, Joseph B	CGC
Bennett, Fred C	CGC
Byrne, Edward Peter	SLA; Note 14
Barker, Stephen R	PWM
Bishop, Edward P	PWM
Bleakley, Wayne W	Note 12
Burr, Kinsley	CJW
Booth, John C	PWM
Bircbler, Oscar A	PWM
Biber, Walter E	PWM
Bruegger, Edwin K	PWM
Brown, Sidney F	PWM
Bolt, Dean B	DAF
Billuns, Val T	DAF
Brock, William A	CGC

C

Carter, William Jamison	SLA; FOB
Crosby, Victor Anderson	SLA; GLC
Cooper, Howard	FLA; DMA
Cary, Joseph Breckenridge	SLA; PMT
Canmack, Howard E	DMA
Crook, Maurice W	TFT
Carlberk, Don Philip	SLA; BFT
Cook, Ray C	CWT
Cote, Charles Louis	SLA; PMT
Clark, Roy E	WFO
Courtney, Edward W	WFO
Cann, Frederick B	PMT
Casey, Michael J	HHN
Cunningham, Edward Gilmore	SLA; KST
Choate, George Francis	SLA
Canfield, John P	FRF
Cornthwaite, Guy Huber	SLA; WFO
Clark, George Arthur	SLA; KST
Casey, Albert Francis	FLA
Childs, Charles W	FLA
Claghorn, James Lawrence	FLA
Clyde, Robert William	FLA
Cone, Clarence Nelson	FLA
Coulter, Wilmer Vincent	SLA; SAG
Caldwell, Victor B	DMA
Cross, Eugene Herbert	CWT
Collins, Kenneth Roger	CWT
Cunningham, Parker Hale	FLA; DAP
Cleaver, Carl Donald	SLA; CWT
Craighead, Philip Brooks	SLA; SAG
Crisp, James Van D	DAP
Crary, Roy Jennings	SLA; CFT
Close, Wirt George	SLA; GLC
Cartmell, Nathaniel J	HHN
Cordner, Frank N	FLA
Coulter, Marion Elmer	SLA; BFT
Carleton, George Leslie	SLA; FOB
Clough, Charles E	WFO
Carr, Harold H	WFO
Coray, Francis M	SAG
Connell, David Evans	CWT
Coleman, Leighton H	WFO
Case, Ira H	DMA
Cross, John Milton	SLA; BFT
Close, Wirt G	PWM
Conrad, Charles M	ABC
Crawford, Norman F	CGC
Cain, George W	PWM
Chandler, George D	PWM
Cushman, Robert G	PWM
Casey, Mathew A	PWM
Clark, Dana V	PWM
Clark, Lucius L	PWM
Callender, Lynn West	SLA; CWT
Cramer, Parker D	SBI

D

Dahl, Newton A	WFO
Deaton, Ernest A	HHN
Deuel, Thorne	CGC
Day, Oswald Newton	SLA; VBW
Downey, James Francis, Jr	SLA; CRI
Dupre, Naasson Kelley	SLA; KST
Dunn, Stanley Mangold	SLA; BFT
Duncan, Thomas	DMA
Davis, Thomas Jefferson	SLA; BFT
Dice, Agnew T., Jr	FLA
Davis, Paul Herbert	SLA; GLC
Davidson, William Gilman	SLA; KST
DeForrest, John	CUI
Darr, Harold S	ABC
Dudley, George Louis, Jr	SLA; CWT
Duke, Leslie B	TFT
Dungan, Edmund Dale	SLA; BFT
Denny, Harman Denny, Jr	FLA
Dooley, William Thomas	FLA
Daubner, George Elton	SLA; VBW
Dana, Alfred L	CAF
Daugherty, Earl Stanley	SLA; MAC
Dahl, George Leighton	FLA
Duke, Will B	WFO
Drake, Albert Burbank	SLA; BFT
Dean, William Winter	SLA; VBW
Downey, Hugh Chester	SLA; BFT
DeForest, Edward Earley	SLA; CWT
Duke, Llewellyn B	WFO
Dawson, Earl Rufus	SLA; BFT
Donohue, Gerald	SLA; PMT
Davis, William Kinnard	SLA; CFT
Davidson, William G	WFO
Davis, Harris Eli	SLA; PMT
Davis, Paul J	PWM
Douglas, Norman J	PWM
Dooley, William T	UTA
Dhein, Orian I	CGC
Dunton, Delmar H	CGC
Davidson, Kenneth S	CGC
Darling, Harold P	HHN

E

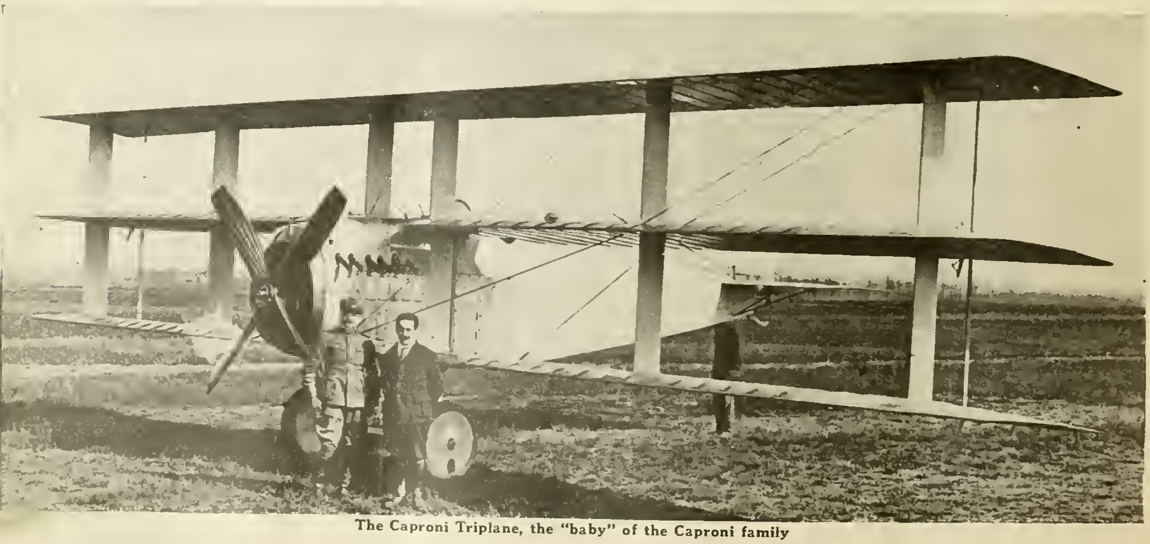
Edwards, Richard Dix	SLA; CRI
Earl, Kenneth Alexander	SLA; SAG
Evans, Stephen G	TFT
Elsasser, Hugh	EOT
Evans, John Manderson	SLA; LHV
Engblom, Oscar H	CWT
Eich, Charles P	CUI
Ely, Matthew G	REL
Edgerton, James Clark	FLA
Edwards, Paul Nelson	FLA
Egan, T. Francis	FLA
Evans, Frederic W	FLA
Elliott, Clifford W	DIK
Eames, Richard Davis	SLA; TFT
Elliott, Daniel Walter	SLA; MAC
Ellershaw, William	CGC
Eddy, Charles Peirson	SLA; ELA
Essig, Fred N., Jr	SAG
Edward, Frederick E	EOT
Evans, Dean P	PWM
Elleman, Clifford	PWM
Epler, Earl N	WFO

F

Foster, Traverse S	ARV
Ford, Fred M	CGC
Frantz, Samuel Gibson	SLA; FOB
Fristoe, Horatio Monroe	SLA; UTA
Fouraker, Raymond Spivey	SLA; GLC
Franz, Joseph Parke	SLA; EOT
Frew, James Ramsey	SLA; BFT
French, Leigh Hill	VBW
Fenno, George F	CPA; DMA
Fogel, Martin	TFT
Fitch, Victor W	DMA
Franklin, George T	TFT
Flynn, Mortimer G	TFT
Farnam, Julian P	MAT
Fickel, Jacob E	JMA
Forrest, Robert Porter	SLA; KST
Fitgerald, William J	WFO
Fagan, Paul I	CPA
Feitner, Quentin Field	CPA
Faris, Nicholas D	WFO
Forsyth, Ralph E	WFO
Fife, John A	EOT
Fishleigh, Clarence Turner	SLA
Flood, Albert Edward	SLA; BFT
Foster, William J., Jr	TMA
Frindel, Samuel, Jr	Note 3
Frees, Arthur L	DMA
Farnham, Charles V	PWM
Siedle, Raymond A	CGC
Fairclough, Richard E	PWM

G

Gearish, Charles Alanson	SLA; ABC
Guild, Bartlett	SLA; KST
Gabbert, Thomas Arthur	SLA; BFT
Greer, Jack	SLA; BFT
Galligan, Frank Andrews	SLA; TMA
Grethen, John P	WFO
Goodnough, Lewis E	WFO
Garrity, George F	HHN
Glogau, William E	FRF
Gile, Richard D	CGC
Guilford, Edward H	DMA
Gallagher, Benjamin H	TFT
Gunther, Lawrence O	TFT
Griffith, Ralph E	FRF
Gray, Clifton Charles	SLA; ARV
Gillespie, Franklin Simcoe	SLA; BFT
Garner, Bernard R	TFT
Greene, Charles C	TFT
Greenshields, Bryce W	BST
Gray, Will K	RWT
Geisse, John H	SLA
Gregory, William Robert	SLA; LHV
Gardner, J. Francis	SLA; PMT
Graham, John Allen	SLA; VBW
Goodwin, Thomas G	PWM
Guenther, Karl Derby	SLA; CRI
Graham, Ralph Edmundson	SLA; CFT
Grier, Alexander Toadvine	SLA
Greenshields, Bryce Wallace	SLA; PMT
Green, Gerald Robertson	SLA; PMT
Glatts, Bernard R	WFO
Gibson, Howard Lyon	TMA
Grady, George	SLA; CJW
Graves, Thomas E	CAF
Grekila, John Henry	SLA; PMT
Golden, Robert J	CGC



The Caproni Triplane, the "baby" of the Caproni family

The American-made De Haviland "four" and the Liberty Motor "12"

Grange, Hermon S	CGC
Gaston, Wentworth M	CGC
Green, Le Roy S	GLC

H

Hunt, Mark Barksdale, Jr	SLA; SAG
House, William Rowland	SLA; BFT
Hatch, Arthur Clarkson	SLA; PMT
Hughes, Archibald Jones	SLA; BFT
Haseltine, Emery	SLA; CRI
Harris, Dale Andrew	SLA; CRI
Hawks, Horace G	CRI
Hay, Malcolm	SLA; BFT
Harwood, Herhert E	CGC
Harding, Ray Wendell	SLA; ABC
Heath, Fred T	TFT
Hopkins, Frederick M	TFT
Hiatt, Louis Eugene	SLA; FOB
Harvey, George W	DMA
Hopkins, Thomas, Jr	SLA; CWT
Hall, Theodore Edward	SLA; CWT
Helms, Leslie R	CAF
Haskell, Alhert McClellan	SLA; BFT
Heartfield, Charles B	PMT
Hightower, Chares D	TFT
Hudspeth, Clyde E	WFO
Harrison, William H	TFT
Hawley, Walter James	SLA; BST
Hutchins, Jenjamin B	DMA
Huck, Herbert	SLA SAG
Haile, Thomas Jefferson, Jr	SLA: PMT
Holmes, James Everette	SLA; BFT
Hain, Calvin S	WFO
Hutson, Harry M	TFT
Hager, John Manfred	FLA
Hamilton, Andrew A	WFO
Hickman, James Clarence	SLA; TMA
Hatch, Horace McK	UTA
Hill, Thomas Russell	SLA; CUI
Hoyt, Werner F	EOT
Howeth, Woodfin Grady	SLA; TMA
Hamilton, Andrew Alexander	SLA: ELA
Hansell, Don Marvin	SLA; CWT
Hardage, Lewis Woodford	SLA; BFT
Harris, Ray Guy	SLA; BFT
Hart, Haden B	WFO
Hall, Norman Sanford	SLA; MAC
Hampton, Stanlee Rohbins	SLA; MAC
Hoag, Elbert C. H	CGC
Harrel, Samuel C	DAF
Hancock, William W	Note 8
Harding, Clifford L	Note 3
Harris, Harold R	Note 15
Hart, Elwood N	CUI
Huher, Gilhert J	CGC
Halsey, Wilmot B	CGC
Hitchcock, William C	CGC
Hersey, Henry B	DMA
Hudley, Lawrence B	CGC
Henderson, Denny E	CGC
Hodgson, Harold C	CGC
Hewins, John H	PWM
Haggerty, Lyman H	CGC
Hansom, Archie M	CGC
Hartnett, Harold J	CGC
Hezlett, Edward H	PWM
Haskell, Albert M	EOT

I

Irwin, Theodore H	FRF
Irwin, Charles Lewis	SLA; ABC
Irwin, Harry A	DMA
Ingersoll, Edward	CPA

J

Joseph, Samuel	SLA: EOT
Jackson, Ralph L	TFT
Jones, Charles Edward, Jr	SLA; CRI
Joquel, Arthur Louis	SLA; BFT
Joyce, Frank Arthur	SLA; VBW
Johnson, Henry Alto, Jr	SLA; EOT
Johnson, Emil R	DMA
Jackson, Roger William	SLA; CWT
Janssen, Edward A., Jr	FRF
Jackson, Allan Cummings	SLA; PMT
Jones, Kenneth Hugh	SLA; CRI
Johnston, Ralph Steele	SLA; RSD
Johnson, Albert Loftin	SLA; MAC
Johnson, George T	RWT

K

Kelty, William R	FRF
King, Cloize Anthony	SLA; BFT
Krech, Karl Gilbert	SLA; CUI
Kuechler, Gustave Henry	SLA; SAG
Kingsley, Daniel P	ARV
Kempter, Charles W	CGC
Kelley, William Michael	SLA; BST
Kase, John A	SLA; TMA
Kitchen, Benjamin Ford	SLA; BFT
Kidder, Charles D	DAP
Keith, Edward	SLA; BFT
Kirshner, Robert F	FRF
Kenny, Frederick Putnam	FLA; TMA
Knight, Frederick Hammond	SLA; CWT
Kohler, Raymond Lloyd	SLA; CWT
Kinnear, James Stewart	SLA; MAC
Keelan, Frank Bernard	SLA; VBW
Kendall, Harold Laverne	SLA; SAG
Kotcher, George Andrew	AMV
Kennedy, James Edward	SLA; BFT
Kinne, Harold Clarence	SLA; CWT
Knowlson, Roland Southard	SLA; CWT
Knight, Earl W	SLA
Kraft, Lester L	WFO
Kinney, Kenneth Kieran	SLA; CFT
Kirkham, James E	WFO
Kellegrew, Edward W	HHN
Keeley, James H., Jr	PWM
Kilburn, George W	PWM
Kirkpatrick, George M	SBI
Korman, Howard	SBI

L

Lauermaan, Otto Simon	SLA; CFT
Lemon, Hobart Flint	SLA; BFT
Lyle, John Maruquess	SLA; BFT
Lamkin, William L	RWT
Leary, Matthew Mark	FLA; HHN
Leonard, Kenneth Lee	SLA; BFT
Layne, Edward Goode	SLA; CWT
Lewis, Halstead H	TFT
Ligon, Rohert	CUI
Leadbetter, Arthur Olin	SLA; LHV
Laughlin, Douglass E. S	DMA
Lokey, Thomas E	DMA
Lowell, Rohert Horace Wentworth	SLA; CRI
Lloyd, Thomas Leslie	SLA; CWT
Loehr, Theodore Edwin	SLA; CWT
Lee, Everett Samuel	FLA
Landstrom, Adolph Walter	SLA; CFT; WDM; Note 1
Lynch, Russell William	SLA; PMT
Lovell, Walter	FRF
Lausier, Edwin B	DAP
Lindstrom, Alfot J	EOT
Lake, Horace A	SLA
Lucey, Edgar A	Note 7
Lindsay, Philip K	CGC
Lincoln, Oren E	Note 10
Linda, Lloyd B. Vanda	CGC
Lewis, Thomas J	PUP

M

Montell, Arthur Cleveland, Jr	SLA; BFT
Morgan, Stuart A	CAF
Monticue, Verne M	FRF
Madsen, Gustave Harold	SLA; CJW
Morehead, Hobart E	TFT
Middleton, James Adam	SLA; CWT
Marks, Alan David	SLA; ELA
Moland, George R	FRF
Mauch, Eugene A	CAF
Murphy, Frank D	CRI
Mooers, Clifford	SLA; BFT
Murphy, James Benjamin	SLA; BFT
Merrill, Mazel Melburn	SLA; BST
Mahr, Ralph E	WFO
McNeill, John Francis	SLA; CFT
Mingins, Leicester Holm	SLA; CRI
Mullaney, John F	FRF
Miller, Arthur J	WFO
Massingill, Martin L	TFT
Myers, Norman Harley	SLA; KST
Murphy, Eugene A	FLA
Morgan, John R	WFO
Murphy, William Thomas	SLA; AAD
Musick, Edwaard	SLA; CWT
Murphy, Harry Joseph	SLA; SAG
Meyer, Charles Louis	SLA; BFT
Miller, Rudolph Nelson	SLA; SAG
Mahoney, Justin T	EOT
Martin, Bruce Broadway	SLA; SAG
Miller, Heber Curtis	SLA; MAC
Montague, Harley H	TFT
Morgan, Charles Lewalling	SLA; BFT
Ming, Christopher Morris	SLA; SAG
Miles, Homer Ulysses	SLA; TMA
Manzelman, Earle H	SAG
Mann, Hammond V	Note 3
Mulder, Leon L	Note 2
Martin, John M	CRI
Maynz, Theodore	TFT
Matthews, Stanley G	SBI
Merrill, Cedric V	SBI
Morgan, Harry R	CGC
Mulvihill, Bernard H	CGC
Metcalf	DMA
Meyer, Charles L	PWM

Mc

McDonald, Frank Witten, Jr	SLA; CFT
McKinney, Coryell	CGC
McKinney, Carlos James	SLA; EOT
McKinney, Norman	SLA; KST
McCracken, Nelson	DIS
McElihinney, Ralph L	WFO
McLinden, Daniel Joseph	SLA; TMA
McClure, Lloyd Milton	SLA; KST
McKee, James Dalzell	SLA; SBI
McNamara, Sherman E	KST
McCarl, Merritt D	SLA; VBW
McMullen, Ivon Dale	SLA; VBW
McCord, Charles G	TMA
McClees, Ralph L	SAG
McEvers, Ernest	WFO

N

Noble, Arthur W	ELA
Noon, Frank Joseph	SLA; BFT
Northrup, James A	MJA
Neil, James G	BST
Nordhorn, Welzie Louis	SLA; ABC
Nelson, William T	FRF
Nason, George H	WFO

O

O'Neil, Larkin Alucious	SLA; ABC
Overcashier, Clarence Stanley	SLA; CFT
O'Brien, Matthew H	CGC
O'Sullivan, Matthew H	SLA; SAG
O'Neil, Henry, Jr	SLA; SAG
O'Brien, Thomas Edward	SLA; MAC
O'Donnell, Paul J	SLA
Ozanne, Porter L	UTA
Owen, Hubert Keys	FLA
Overley, Harry Russell	SLA; SAG

P

Phelan, Joseph Percival	SLA; SBI
Pendleton, Howard	DMA
Pitkin, Loren H	DMA
Perry, William H	RSD
Preston, Charles Raymond	SLA; LDT
Phelps, Edgar Manly	SLA; VBW
Pingenot, Augustus Celestin	SLA; CFT
Phillips, Douglas Lucas	SLA; HHN
Peterson, Lowell McKinley	SLA; SBI
Patton, Glenn Arthur	SLA; SBI
Payton, Gwvnne Harrison	SLA; BFT
Panzer, Carl Herman	SLA; KST
Pooley, Edward Murray	SLA; CFT
Perego, Alfred K	WFO
Pilkington, Fred W	TFT
Pound, Murphey	TFT
Poe, William L	TFT
Peterson, Amos G	CGC
Parsons, Willard Charles	SLA; ABC
Pinaire, Owen Hobart	SLA; BFT
Porter, Philip Wells	SLA; BFT
Penfield, Paul	SLA
Pfaff, Lawrence L	SLA
Posey, John A	SLA
Perego, Alfred Kenneth	SLA; KST
Preston, Charles Raymond	LDT
Pence, Winfield S	WFO
Pratt, Henry C	DMA

FOREIGN NEWS

GREAT BRITAIN

A report from Saloniki on Sept. 19 says: "Four of our scouts engaged fourteen enemy machines and crashed two of them to the ground. One of our machines is missing.

"Clouds and a strong wind interfered with air work on Sept. 18 and observation was carried on with difficulty. Squadrons working on the 3d and 4th Army fronts kept in close touch with the troops, reported positions of enemy batteries and delivered ammunition to machine gunners in the forward areas.

"Five and a half tons of explosives were dropped and two hostile machines were downed and two sent down out of control. None of our machines is missing. Night flying was impossible."

The British air forces have dropped sixty tons of bombs on German territory in five days. This exceeds the record for any previous fortnight.

These long distance raids have been directed chiefly against poison gas and aeroplane factories at Mannheim, the Daimler works at Stuttgart, the railway station at Frankfort and the docks and sidings at Karlsruhe. Their destructive effect is shown by photographs.

Aerial assaults over the battle area have been numerous. Acting in conjunction with the Franco-American offensive thirty-five separate raids were made between September 13 and 16 against important enemy aerodromes and vital railway junctions. Thirteen of them were against the Metz-Sablon railroad.

Altogether British airmen have dropped 120 tons of bombs upon the western battle front in the course of a week exclusive of the explosives dropped in Germany. Nineteen tons were dropped on Bruges, Ostend and other German coastal defences in air fighting, during which seventeen enemy machines were destroyed and nine disabled, while five British planes were lost. The number of German machines destroyed altogether in the week was 101, while thirty-seven were disabled. The British losses totalled fifty.

The allied independent air force dropped bombs on Sept. 20 on Mannheim, Karlsruhe, Boulay, Frescaty and Morhange, according to an official statement issued by the British Government.

Explosives were dropped on the Lanz works at Mannheim, on wharves and factories at Karlsruhe, on blast furnaces at the Burbach works and on aerodromes at Boulay, Frescaty and Morhange. One German machine was brought down. One allied machine is missing.

On the front held by Field Marshal Haig nineteen German aeroplanes have been accounted for by British airmen, while the British themselves have lost eleven machines, according to Marshal Haig's report, which says:

"Despite low clouds and frequent showers our aeroplanes carried out useful work in all departments Friday.

"Sixteen hostile machines were downed and three sent down out of control. Eleven of ours are missing.

"Twenty-six and a half tons of bombs were dropped during the twenty-four hours.

"Eleven tons of bombs were dropped on Sept. 22. Eight enemy planes were destroyed. Four of ours are missing.

"That night four tons of bombs were dropped on the Valenciennes aerodrome.

"The Greeks co-operated in the bombing of Constantinople on Sept. 20 and 21 and dropped thousands of leaflets into Stamboul.

"A balloon, shot down in flames in the European operations set fire to three hangars, which were burned out."

Machines of the British Independent Air Force dropped nearly sixteen tons of bombs on German aerodromes and on blast furnaces in the Metz region on Sept. 21, it was officially announced.

The blast furnaces attacked were those at Hagendingen and Rombach. Four enemy aerodromes were bombed by the raiders.

Fifty-three hostile aeroplanes were accounted for by British aviators on Sept. 24, acording to the official announcement. Thirty-one of these were destroyed and twenty-two were driven down. Ten British machines failed to return. More than 2,000 photographs were taken and 12½ tons of bombs dropped in twenty-four hours.

British aeroplanes dropped bombs on Sept. 25 on the German city of Frankfort, according to an official statement issued by the War Office. Five enemy machines were shot down. Four British aeroplanes are missing.

Another communication says: "On Sept. 25 ten enemy machines were brought down. In twenty-four hours we dropped thirty-five tons of bombs on aerodromes and railways."

The German aerodromes at Buhl, twenty-five miles southwest of Karlsruhe, and Kaiserslauterm, between Metz and Mannheim, have been bombed by machines of the British Independent Air Force. Fighting took place during the expedition, with the result that two enemy machines were destroyed. Three of the British machines have not been located.

British aeroplanes on September 25 dropped bombs on the German city of Frankfort, according to an official statement issued by the War Office. Five enemy machines were shot down. Four British aeroplanes are missing.

The following official communication dealing with the operations of the British independent air force was issued on September 27:

"In conjunction with the Franco-American operations Thursday our machines in the afternoon attacked the railways of Metz-Sablon and Audun-le-Roman with good results. Large numbers of enemy aeroplanes were encountered and bitter fighting took place.

"Two enemy machines were destroyed and one was sent down out of control. Six of ours failed to return.

"On the night of September 26 in heavy attacks on the Metz-Sablon region many direct hits were observed. The railways of Mezieres and Thionville and the Frescati aerodrome were attacked. There were several direct hits on the Thionville station and junction. All our machines returned."

Another communication, dealing with operations over other parts of the fighting front and behind the lines, says:

"Our machines on September 26 carried out a large number of reconnoissance flights and manoeuvres for observing the effect of our artillery fire.

"More than twenty tons of bombs were dropped on railheads and billets. In a raid on an enemy aerodrome several hangars were set on fire and a hostile machine was destroyed on the ground, and seven others which attempted to repel the attacking squadron were shot down. Four hostile machines were destroyed on other parts of the front. Five of our machines were missing during the day. Little flying was possible at night."

The British aerial communication of September 28 says:

Our machines were active on every part of the front throughout Friday that kept close watch from the air on the course of the various operations. Bombing patrols carried out at a low altitude along the battle front attacks on enemy troops and transports at the canal crossings and along the roads, and heavily engaged the enemy with machine gun fire.

Four machines, working in coöperation with the artillery, reported a great number of targets and observed the fall of the rounds. Many explosions and fires were observed in hostile battery positions. Over a thousand photographs were taken during the day.

In addition to extensive bombing just beyond the lines, several enemy aerodromes and a number of railway junctions were attacked with excellent effect. Thirty tons of bombs were dropped by us in the day and eighteen and a half tons at night.

Twenty-two German machines and eight balloons were shot down by our airmen. Twenty enemy machines were driven down out of control in the course of the air fighting. Another machine was destroyed by anti-aircraft fire. Nineteen of our machines are missing.

In the last week the British airmen have undertaken important offensive operations in no fewer than six separate theatres of war, ranging from the coast of Flanders to the fringes of the Syrian Desert.

On the northern coastal sector destructive aid raids were made upon the German submarine, naval and aircraft stations in Belgium. On the battlefront in France there was intense air fighting between La Bassée and Péronne on the St. Quentin road. On the Rhine front sixteen bombing raids were made by the R. A. F. Independent Force into Germany. On the Salonica front there was much low-height bombing and machine-gun fighting from the air on the roads to Strumnitza. The Aegean front was chosen for a double raid upon Constantinople, causing damage to the station and military buildings at Nagara and Stamboul. The Palestine front was marked by great British aerial activity, resulting in heavy destruction of enemy transport stores and war material, and heavy casualties to the retreating enemy.

Two points of unusual interest stand out in this fighting, the increasingly important part played by aerial reconnoissance in preparing the way for an offensive, and the striking power of modern aircraft to intensify the disorder in the rear of a defeated army. Thus, in Palestine, contingents of the Royal Air Force and the Australian Flying Corps have been carrying out reconnoissance upon a wide scale over the maritime plain stretching from Mount Carmel to the Shechem-Joppa road, as well as over Samaria and the Valley of the Jordon from the edge of the Judean Plateau to the Sea of Galilee. Excellent aerial photographs were taken, which proved of very great value to the British Staff. Other aerial contingents, crossing the eastern range of hills, attacked vigorously the enemy centres at Amman and Deraa, on the Hedjaz Railway.

These operations were preliminary to the offensive at the end of the week. Acting in close coöperation with the infantry and cavalry, British airmen on the night of September 18 heavily bombed the vital railway junction at El Afules, south of Nazareth, thus hindering the dispatch of reinforcements from the north and adding enormously to the difficulties of the enemy. Throughout the following day British aeroplanes bombed the enemy's headquarters and harassed his retreat by firing many thousands of rounds and dropping more than eleven tons of bombs behind his lines.

Nablus, the strategic centre of Samaria, was heavily attacked by air from the commencement of the offensive, and on September 21 and 22, as the Turkish retreat developed into a rout, British airmen inflicted very heavy casualties and enormous material damage upon the enemy in the congested mountain roads, notably on those leading to the famous Damieh Ford across the Jordan.

Scarcely less disastrous to the enemy were the operations of the British airmen on the Salonica front. Here, as in Palestine, a large number of reconnoissance and bombing raids were carried out prior to the offensive on September 18. On the morning of the 21st aeroplanes brought timely advice of the impending retirement of the enemy, extensive fires being observed at Hudova station behind the lines, while later in the day the Kosturino-Sturza road was seen to be densely packed with troops and transports, hurrying to the rear. Squadrons of British airmen continuously attacked these from a low height, causing much material destruction and many casualties.

The work of the airmen in the battle zone is described by Field Marshal Haig in his report of September 29 as follows:

"The air force coöperated in every phase of Saturday's operations. Patrols carried out flights far behind the German lines, reconnoitering roads and railroads by day and night. In spite of the clouds and rain, successful observation for the artillery was accomplished. The location of advancing troops was constantly reported to the headquarters of all formations. Enemy troops were bombed and machine-gunned from extremely low heights and heavy casualties were inflicted.

ITALY

The aerial activity was handicapped by the bad weather prevailing on the whole front during the last week, nevertheless numerous bombardments were made by our squadrons on the important deposits of the enemy. The enemy's aerial activity did not amount to anything.

Italian Headquarters publish the following summary of both the Italian and Austrian losses during the last big drive from the 20th of June until the last of July.

(from the 20th of June until the 1st of July)

Austrian machines brought down	150
Austrian balloons brought down	5
Italian machines lost	16

(During the month of July)

Austrian machines brought down	109
Austrian balloons brought down	2
Italian machines lost	4

These numbers show the great superiority of the Italian Aviation compared with the Austrian, and it is increasing each day.

The statements of the prisoners continuously confirm the terrible effects of the Italian Aviation in the bombardment work and in the machine-gun attacks on the soldiers.

Entire forces were destroyed by machine-gun fire from special armored aeroplanes at a very low altitude.

The Italian Aviators carry on with great success on the discouraged Austrian population a propaganda by means of pamphlets.

MODEL NEWS

Edited by John F. McMahon

Model Aeroplane Building as a Step to Aeronautical Engineering

When wings are finished, the struts should be made. These are made of spruce 2" x 1", 4' 10" long and corners rounded off to an oval shape. The ends of the struts are tapered to 1" square, after which they are bound by cotton tape and glued to prevent splitting when the eye-screw is inserted. This eye-screw is standard ¼" diameter and can be purchased in any hardware store. The size of the eye should be at least 5/16" and no more than ⅜" in diameter. One of these eye-screws is screwed into each end of the strut as far as it will go as shown in Figure 6.

The strut connection to the wing spar is shown at the right, Figure 1. The reader can see just how it is made and the assembling. The sort of "U" bolt which is used as the clamp is made from a piece of 3/16" drill rod, threaded at each end. A standard size die for threading these ends can be purchased cheaply and the Lexagon nuts as well. Each piece of drill rod is 6⅜" long. After threading each end the piece should be bent to the shape shown in Figure 3. Two plates of iron or steel 1/16" thick to the dimensions given in Figure 2. These plates are placed over and under the wing spar. When set up on the wings the bracing wires or turnbuckles are fastened to the eye-screw and "U" bolt as shown in the sketch, Figure 1. The reader will note that the strut fittings for the eight outer struts are fastened alongside the bracing strut in the wing, while the four center struts are fastener directly over or in line with the wing-bracing struts. When placed over the struts it is necessary to drill a 3/16" hole through the metal straps 2 19/32" from the outside edge of the wing spars. No top plate is needed on the center strut fittings as the metal strap will keep them from crushing the wing beam. On the outer strut fittings it is necessary to have something to keep them from moving out of place when a strain is on the bracing wires. A fitting for this purpose is made from a piece of 1/16" thick steel or iron about 1½" long and ½" wide with two 3/16" holes at each end. This plate is bent in the centre and then flattened to the ends to allow it to be screwed to the wing beams, as shown in Figure 4. The inside prong of "U" bolt is then shoved through this fitting and bolted in place. Arrows point from Figures 4 and 5 to show the fittings that apply to the struts. Of course, the rear strut fittings are identical with the front ones.

The plane should be set up before covering to see how things fit, as it is easier to make corrections when covering is not on. When set up, the leading edge of the planes should be 4" higher than the trailing edge, to give it the necessary angle for flying. See Figure 7.

It is necessary to have some sort of support for the operator, so we will place two bars of spruce, 2" x 1", between the two centre struts and fasten them in place with metal straps. Notice that the bracing wires don't go to the bottom fittings in this case instead the end at the cross bars, so as not to interfere with the operator, as he will use these bars to support his weight by hooking his arms over them when in flight. This will be shown later.

The method of bracing is shown in the large sketch. The wires are fastened to each strut fitting and cross to the opposite one, above or below, as the case may be. Some of the bracing wires are left out of the sketch for clearness.

When the reader is satisfied that everything fits correctly, he can cover the planes with some thin, white material, such as muslin, and then dope it with a mixture of 1 pound of powdered glue, 1 ounce of alum, 2 ounces of glycerine, and boiled in enough water to allow it to be painted on with a brush.

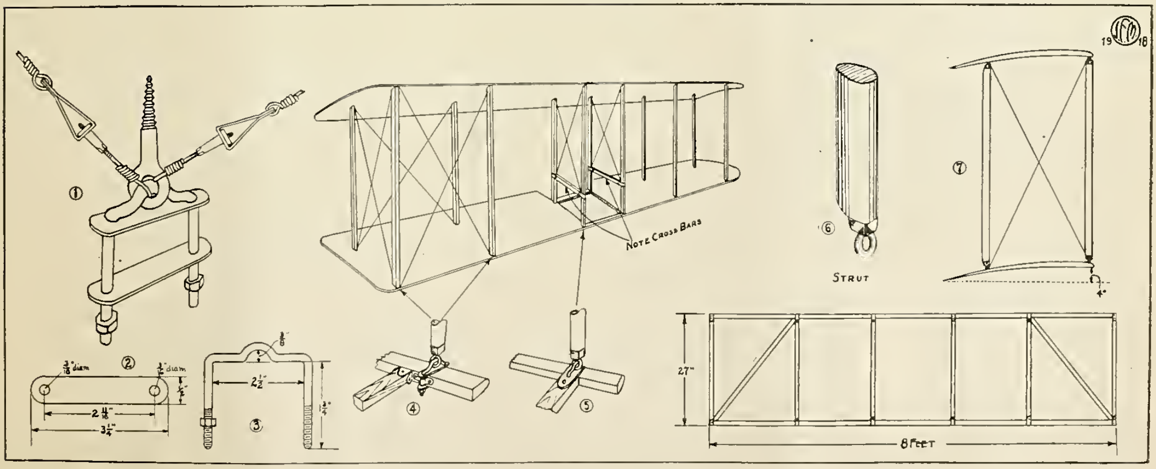
The material should be cut in pieces 10' 6" long and sawed together side by side until the width is over 26' or the length of the planes.

To cover, fasten the cloth to the front wing spar with small tacks. The covering is then brought back, so that the two ends of the cloth double over one another and are fastened at the trailing edge. The strut fittings are not in place when covering is applied, but holes are made for them in the covering.

The tail plane is made of ½" square spruce, as shown in the lower right hand side of the cut.

The cross pieces are fastened to the long strips by thin metal straps and small nails.

(To be continued)



Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

"The Hymn of Hate"—Offensive Patrol

Onward, Baby Nieuports,
Flying out to war,
Lewis guns all loaded
Engines all a'roar.
See, the Flight Commander
Leads against the foe,
Five machines with engines revying
Cylinders a'glow.
Onward, Baby Nieuports,
Flying out to war,
Lewis guns all loaded
Engines all a'roar.

At the sign of triumph
The wily Hun doth flee.
"Dive then, Baby Nieuports,
Dive to victory."
Albatrosses quiver,
Engines glowing red,
Crack! crack! crack! behind them,
Pumping them with lead.

See the Albatros's
Tanks begin to leak,
As the guns of Nieuports
One and all do speak.
Diving ever downwards,
Every wily Hun,
Into flames they're bursting.
"Nieuports—you have won."

Pull your joy-sticks backwards
Zoom towards the skies.
Up to fifteen thousand
Fast the Nieuports rise
Guns once more are silent,
All their rounds are loosed,
Now they're flying Westwards—
Flying home to roost.

Welcome, Bristol Fighters,
Who towards us soar,
Blend with ours your engines
As we homewards roar,
"We have done much battle
With the Albatros,
Never will they fly again
Now they bite the moss."
Onward, Nieuports, Bristols,
Flying out to war,
Lewis guns all loaded
Vickers guns galore.

—The Aeroplane.

Extracts from the Letters of My Chum in France

It is cold and misty, and when it is not misty it is windy, and when it is neither, it rains and so on, but mist from the marshes is the worst by far. So sometimes we sits and thinks and cusses and smokes; and sometimes we just sits.

This morning I stalled machine all round aerodrome. Wind screen completely frozen over; had to take machines to 1,000 feet, lean out and clean screen. Same day got in hot air over factory chimneys. Hell.

Second solo on new type. Sideslipped through not having flying speed on a turn. Ghastly sensation.

Dunno why the other squadron was mentioned in despatches. They have about seven of our chaps there. Maybe that was why, or perhaps the General lost some money at Bridge to the C. O., or perhaps they drew lots for it.

One could hear the bang of the big guns as they fired salvos under us, and at times we got bumps from the shells passing close to us. I don't know how close they were, but they were not fired at us.

Was sent out photographing, had a dozen shots at it and then, as I reached a height of 6,000 feet, I thought I would try to do my first loop. I shoved the nose down, 70, 80, 90, 100 m. p. h. The pitot tube would not register any higher; the liquid went out at the top—pulled the joystick back into my tummy and up went the nose—Gee—how slowly it seemed to go. Ah, she's over at last. Cheer-o. Now I'll write home and tell them. No, I must do another. If I did only one, they would think I had funked it after the first shot. Down goes the nose again, then up-up slower, slower. By Jove, she's going to stick at the top of the loop this time—I grip the joystick with both hands. Ah, she's over. Now I'll get off to the aerodrome and show them how to do it. I was quite bucked at having done it and it was a curious sensation, to say the least. I have been warmly congratulated; they were d—d good loops.

As I was going out of the aerodrome, I flew over a passing car and we waved merrily to each other. Then I chased the car, slowed my engine and dived at it, and a little later flew at it again. The driver must have been watching me too closely, for he went into the ditch. My passenger was awfully bucked about it.

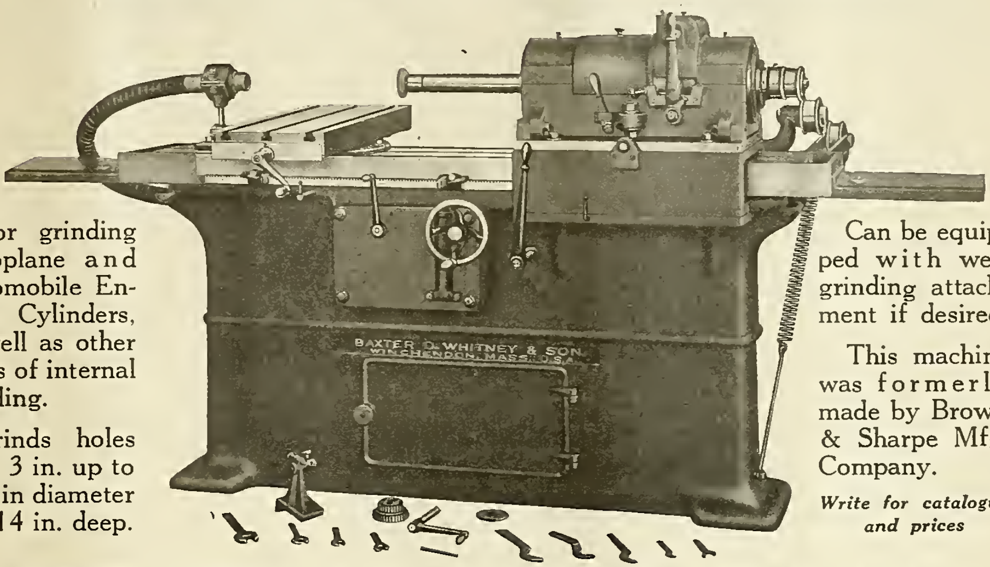
Well, I have very little news for you this time. To let you down lightly, I will tell you that I am having several new walking sticks made, and you, with your usual Sherlock Holmes intelligence, you will deduce, quite accurately, that I have carefully and conscientiously reduced a B. E. 2c. to its molecular constituents—in other words, crashed it.

OUI, THIS IS FRANCE

By "Alex"

I THOUGHT YA SAID YA'D ENLISTED IN TH AVIATION SECTION EBENEZER.
SO I DID FRANCIS X - CAN'T YA SEE M'COLLAR ORNIMINTS AND HAT CORD
OUI! BUT
OH! TH' GAS MASK -
WHASA BRIGHT IDEA CARRYING A GAS MASK WHEN YA FLY. EH!
FRENCH MATCHES!
OH!

Cylinder Grinding Machine



For grinding Aeroplane and Automobile Engine Cylinders, as well as other kinds of internal grinding.

Grinds holes from 3 in. up to 7 in. in diameter and 14 in. deep.

Can be equipped with wet-grinding attachment if desired.

This machine was formerly made by Brown & Sharpe Mfg. Company.

Write for catalogue and prices

Baxter D. Whitney & Son, Winchendon, Mass., U. S. A.

Domestic Agents: E. A. Kinsey Co., Cincinnati, Ohio. Strong, Carlisle & Hammond Co., Cleveland, O., and Detroit, Mich. The Motch & Merryweather Machinery Co., Pittsburgh, Pa. Machine Tool Engineering Co., New York, N. Y. **Pacific Coast Agents:** Portland Machinery Co., Portland, Ore. Perine Machinery Co., Seattle, Wash.

Canadian Agents: Canadian Fairbanks-Morse Co., Montreal, P. Q. **Foreign Agents:** Buck & Hickman, Ltd., London, England. Fenwick Freres Co., Paris, France.

RESISTAL EYETECTS

STANDARDIZED BY THE U. S. NAVY

A special test of RESISTAL AVIATOR EYETECTS was conducted on September 18th by the U. S. Bureau of Standards. This test was both optical and physical. The official report of the Bureau of Standards found that the surfaces of the lenses were flat to within about a dozen wave lengths of sodium light and therefore would not magnify the image nor trouble the user by distorting his vision. One fact of great importance, they said, was **that the lenses gave off no splinters when broken.**

NAVY AVIATORS ARE SUPPLIED BY THE NAVY DEPARTMENT WITH RESISTAL EYETECTS

Send for Booklet telling of many aviators' experiences, for free test pieces of RESISTAL lenses and for the three complete Reports of the U. S. Bureau of Standards.

RESISTAL S & B. N.Y.

Look for this Trade Mark on your goggle lenses

STRAUSS & BUEGELEISEN

Elias Buegeleisen, Sole Proprietor

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GOGGLES FOR EVERY NEED EYETECTS ALL THE YEAR ROUND

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ISRAEL LUDLOW, *President*

EXPORT MILL AND MANUFACTURERS' AGENT **IMPORT**

TELEPHONE 1344 RECTOR

33 WEST 42d STREET NEW YORK, N. Y.

WE SPECIALIZE

3 ply, 5 ply, 9 ply and 15 ply, birch, mahogany, walnut and red gum waterproof veneers. Our products have officially passed Government test of boiling of twenty-four hours and baking twenty-four hours. Capacity 30,000 square feet daily. In an official Government report on sample three and five ply panels submitted by us for test, it was stated—

> **"Boiling tests and salt water soaking tests as follows were made on each specimen: Specimens were boiled for 8 hours, then baked for 24 hours at 100 deg. C.; specimens were soaked in salt water (4% salt by weight) at room temperature for 24 hours and then baked for 24 hours at 100 deg. C.**
>
> **"Results:—The glue held firmly in all tests. Neither the boiling nor the salt water soaking tests caused any indications of separations of the plies of the veneers tested."**
>
> **Dated, March 30th, 1918.**

Laminated wing beams of spruce. We have under contract a supply of aeroplane spruce and could undertake to manufacture 50 sets of 8 wing-beams daily. In an official Government report on a sample wing-beam section submitted by us for test, it was stated —

> **"Conclusion:—These beams carried a much greater transverse load than solid wood beams of the same material and section. The glue joints between web and flanges are stronger in shear than the web section, and the glue had fairly good waterproof qualities. These beams show the superiority of the laminated construction over the solid construction as to strength and great saving in material."**
>
> **Dated, March 11th, 1918.**

We offer single ply birch, maple, walnut, mahogany and red gum in sizes cut to order.

SHIPPER IN CAR LOTS OF

Spruce, Ash, Oak, Birch, Cherry and other manufactured aeroplane lumber.

IMPORTER OF CLAUDEL CARBURETORS

(*Continued from page 212*)

ROCHESTER, N. Y.

Kaiser Trying to Save Throne

From the *Democrat and Chronicle*

The Kaiser is trying to save his throne. He is seeking to end the war before his people find out that he has lost it. He does not want peace. He wants an armistice of a dozen years in which to get ready for another war. He has got himself into a bad hole, and he is trying to crawl out of it. The Germans can give only one acceptable guarantee that they really want peace—that is, the unconditional surrender of the German army and the German navy.

SPRINGFIELD, MASS.

Surrender and Reparation

From the Springfield *Union*

When Germany and her allies are prepared to make an unconditional surrender, then will it be time to discuss matters of territorial settlement in accordance with the principles of essential justice. A peace of concessions to Germany cannot be other than a dangerous peace for the future safety of civilization. Unconditional surrender and reparation for her crimes, so far as such reparation can be made by the payment of indemnities, should be our answer to the Huns' cry for peace.

CHICAGO

No Potsdam Peace Wanted

From *The Tribune*

Potsdam has rested its fate on power. The Allies will rest their fate on power. Potsdam has never kept faith. The Allies will make peace when Potsdam cannot be faithless to it. All the world longs for peace, but the Allies want no Potsdam peace, and will fight until peace is our peace. There is but one answer to such offers of parley as have been made or are predicted. That answer is our redoubled efforts against the enemy. We can rely upon that answer from our fighting men, and we at home must back them with a singleness of purpose matching theirs. All that we can give is little to what they are giving. But let us give with a will. Let the answer of the American people be the answer of the victorious army.

BALTIMORE

Exterminating a Criminal

From the Baltimore *Sun*

Absolute surrender is the sine qua non for peace, the condition precedent to the consideration of terms. The fact to be kept constantly in mind is that this is not a war against a nation or a combination of nations, but against a great criminal which has deliberately organized to conquer and plunder the world.

No Peace by Negotiations

From the Baltimore *American*

There can be no peace by negotiations with the Central Powers as at present organized. This suggestion cannot be put too nakedly or bluntly. It is time for shirtsleeve directness. The United States is preparing to put all of its tremendous potency into the smashing of Hunism. Our getting into this war is no bluff, and Hunism will not be permitted to turn it into a bluff.

CINCINNATI

"On to Berlin"

From the Cincinnati *Enquirer*

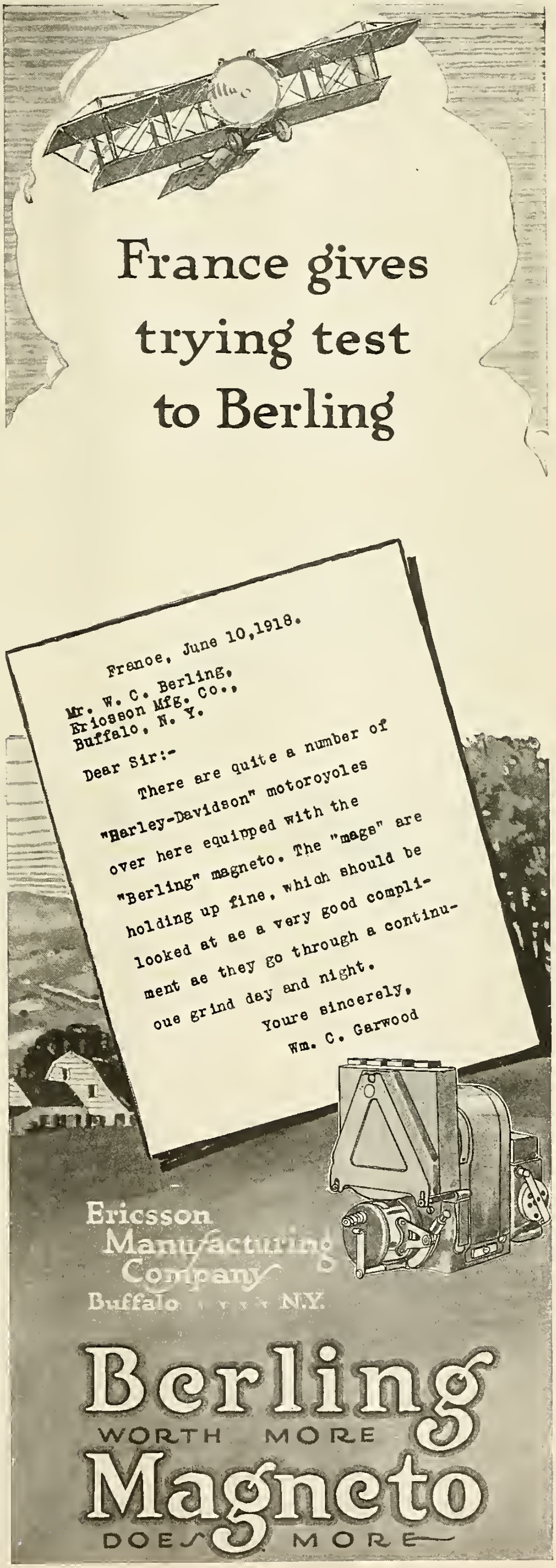
Unconditional surrender will dominate all peace terms considered by America and her allies. The only peace terms that will be accepted will be dictated with the flags of all the Allies floating triumphantly in Berlin. Terms so clearly and forcibly stated by President Wilson, ratified by each and every one of the nations warring against Prussianism—these terms, and these alone, will be accepted at the proper time and place. Restoration and indemnification of Belgium, restitution of devastated France, recognition of independent Poland—these are only a few of the essential, vital and acceptable terms of peace that must be considered at any conference of the Allies. "On to Berlin."

INDIANAPOLIS

Militarism Must Be Crushed

From the Indianapolis *Star*

Militarism must be crushed. That cannot be accomplished by compromise or negotiations; the militarists must lay down their arms, surrender unconditionally, so that there can be no doubt either in the Teutonic mind or elsewhere that the German war machine and the spirit that made it possible has been broken.


France gives trying test to Berling

France, June 10,1918.

Mr. W. C. Berling,
Ericsson Mfg. Co.,
Buffalo, N. Y.

Dear Sir:-

There are quite a number of "Harley-Davidson" motorcycles over here equipped with the "Berling" magneto. The "mags" are holding up fine, which should be looked at as a very good compliment as they go through a continuous grind day and night.

Yours sincerely,
Wm. C. Garwood

Ericsson Manufacturing Company
Buffalo N.Y.

Berling
WORTH MORE
Magneto
DOES MORE

Thomas

THOMAS-MORSE AIRCRAFT CORPORATION

ITHACA, N.Y. U.S.A.

Contractors to U.S. Government

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LANDING
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is the latest and highest development in the construction of Landing Gear

Their
SIMPLICITY
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make them the logical equipment for the Modern Airplane.

Weight 96 pounds complete with tires built for craft weighing 2500 pounds

WHEELS and LANDING GEARS built for any size machine

"Complete data on Ackerman Equipment is available for Designers and Engineers."

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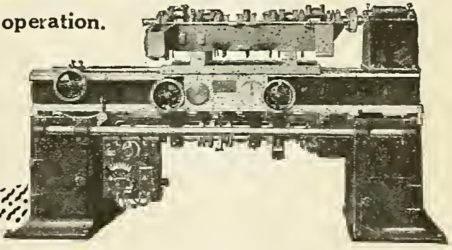
542 Rockefeller Building, CLEVELAND, OHIO. U.S.A.



Rapid Balance at Nominal Cost.

The old fashioned cut and try method of obtaining running balance—especially with turbine rotors, motor-generator sets, having two armatures mounted on one shaft or with other very long rotating elements—often required efforts extending for days or even weeks, accompanied by much "higher mathematics" regarding critical speeds, etc.

These difficulties have been so multiplied by the modern tendency toward constantly higher speeds that they almost determined the limitations of the designing engineer. With the advent, however, of the

CARWEN DYNAMIC BALANCING MACHINE

These problems have been solved by a direct, straightforward procedure, which quickly determines the exact amount of metal to be removed from, or added to, any rotating element to put it in exact running balance. It also locates positively where this change should be made.

With ordinary shop skill and a "Carwen", 100 armatures (or crankshafts) can be put in precise running balance—not mere static balance—in an 8 hour day.

Made in sizes suitable for balancing objects weighing all the way from 5 oz. to 15,000 lbs.

Send for illustrated booklet that describes principle and operation.

The Carlson-Wenstrom Co.
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Makers also of CARWEN Double Row Ball Bearings

Porter, Henry W.	TFT
Price, Carl Edward	SLA; VBW
Peahody, George H.	DMA
Phinney, Berton Vesper	SLA; BFT
Polson, Harold John	SLA; TMA
Prosser, Frank H.	FRF
Prosser, James Roy	SLA; BFT
Powell, Russell E.	CGC
Pawson, James Martin	SLA; BFT
Pettis, Edward V.	WFO
Price, Owen N.	EOT
Parsons, Frederick C.	CGC
Piper, Raymond A.	CGC
Pruden, Gordon L.	RWT
Powell, Clifford Ross	FLA
Painter, Parker	EOT
Pierce, Dale Frank	SLA; SAG

R

Randall, Norman LeRoy	SLA; KST
Royall, Nelson M.	FRF
Rothwell, John Henry	SLA; BFT
Rushing, Edgar	CGC
Rohinson, Goldshorough	SLA; CIT
Rice, Hyland Pennington	SLA; KST
Rice, Ward Hench	SLA; TFT
Rafter, John Michael	SLA; SBI
Russell, Thomas Arnold	SLA; CRI
Russell, Herhert O.	;DMA
Regan, Joseph J.	CWT
Reymiller, John L.	HHN
Rumney, Andrew C.	WFO
Reilly, Henry H.	TFT
Russell, Charles P.	PWM
Roullot, John P.	HHN
Regan, Francis Martin	SLA; BFT
Ross, Russell Alger	SLA; BFT
Requa, Charles Park	SLA; LDT
Reardon, John Joseph	SLA; PMT
Riley, Howard W.	WFO
Rohinson, Malcolm G.	EOT
Rahsman, Arthur H.	CGC
Riha, Leander W.	CGC
Rodefeld, Edward F.	WFO
Ransone, Phillip G.	CGC
Russell, Lawrence L.	EOT
Rowley, Garold Newton	SLA; CJW
Rafferty, Harry Rusher	SLA; ABC
Rohinson, Paul Donald	SLA; SAG
Runchey, John E., Jr.	EOT
Reid, James D.	WFO
Ray, Chester M.	WFO
Roemer, Alhert John	SLA; KST

S

Sandusky, Henry C.	TFT
Skillman, William Edgar	SLA; TMA
Sanford, Frank Warren	SLA; CRI
Silverman, Silas Paul	SLA; CRI
Salishury, Glen D.	DMA
Schaper, Lawrence Charles	SLA; ABC
Smith, Allyn G.	SRC
Storrs, Alhert Miller	SLA; BFT
Sigourney, Harry C.	CPA
Smith, Marshall Charles	SLA; SBI
Silhert, Samuel B.	TFT
Speck, Harry L.	TFT
Simons, Leon M.	CUI
Squier, Merril A.	HHN
Shekleton, Vincent	SLA; BFT
Spencer, John Wesley	SLA; CJW
Shamper, James R.	FRF
Sewell, Bruce Eaton	SLA; DAP
Scott, Howell John	SLA; DAF
Spafford, Louis H.	ELA
Smith, Eben B.	TFT
Sehree, George M., Jr.	FRF
Smith, Edward L.	HHN
Sanderford, John Roy	SLA; KST
Samsen, George Frederick	SLA; CRI
Slimmon, James B.	CGC
Stephens, Orville L.	SLA; BFT
Saunders, William H.	CPA
Sheldon, Herhert Leslie	SLA; TMA
Short, Mac	SLA; EOT
Shaw, Francis Earl	SLA; CWT
Stratton, Edwin Larettus	SLA; CFT
Sigler, Ernest Remhert	SLA; KST
Stephenson, Raymond W.	HHN
Stewart, James D.	TFT
Stone, Virgil D.	TFT
Schruhhe, Earl Francis	SLA; SBI
Stauffer, John L.	TFT
Sanderford, John R.	WFO
Smith, James Hodgens	SLA; KST
Sunderland, Alexander G.	TFT
Sullivan, Charles B.	EOT
Shaner, Edgar Freemont	SLA; BFT
Smith, Irving Edward	FLA
Stinson, Earl W.	PUP
Scofield, Edward E.	PWM
Spencer, Albert O.	PWM
Stone, William C.	PWM
Schafer, Alfred G.	PWM
Simon, Charles H.	PWM
Snyder, William J.	PWM
Sullivan, Cornelius Francis	SLA; VBW
Snider, Paul Hustead	SLA; VBW
Sanders, Ralph Edward	SLA; BST
Strauh, Van V.	HHN
Secord, Lynn N.	LDT
Stoll, Frank Henry	SLA; LDT
Smith, Clarence Franklin	SLA; FOB
Sauter, Raymond J.	TMA
Strome, Carey Lloyd	SLA; CFT
Shanks, Herschel Vespasian	SLA; BFT
Schoepf, Alfred W.	GLC
Stoddard, Walter A.	UTA
Stauffer, John Ervin	SLA; KST
Salzman, Rafael Louis	SLA; VBW
Simpson, George L.	SBI
Spain, Thomaas Howard	TMA
Spencer, Edward J.	WFO
Sharp, Chester J.	FLA
Smith, Harold W.	WFO
Salyers, Charles D.	EOT
South, John C.	CGC
Spencer, Raymond C.	CGC
Steinhauser, Harry H.	CGC
Seawell, John L.	CGC
Scott, Ernest D.	CGC
Sproull, William C.	CGC
Seavey, Calvin Charles	SLA; BFT
Slattery, Thomas A.	UCB
Sprague, Lloyd Drummond	SLA; KST
Sullivan, Edwin	SLA; BFT
Strome, Carey Lloyd	SLA; CAF
Stauffer, John Ervin	SLA; KST
Sinks, Victor H.	EOT
Strehle, Robert Lobingier	SLA; BFT
Sly, Nelson Aldrich	SLA; ELA
Schroeder, Clarence W.	UIU
Strong, Foster G.	PWM
Sargent, Winthrop Otis	SLA; BFT
Stedman, Livingston B.	WFO
Soper, Arthur A.	UTA
Stolz, Alexander Francis	SLA; BFT
Seifert, Fraank W.	EOT
Shelton, William Gentry	SLA; CJW
Schumacher, Herman O.	CWT
Stein, Charles J.	Note 10
Starring, David S.	Note 17
Shaffer, Harry	SLA
Stocking, Homer M.	Note 3
Smith, Dewitt C.	Note 3

T

Twitchell, Roger T.	WFO
Terry, Daniel Grant	SLA; BFT
Tbompson, Marvin Waterbury	SLA; GLC
Thompson, Gough W.	WFO
Tobey, Paul T.	LHV
Tapley, Elmer Bahhidge	SLA; KST
Tehh, Gordon Edward	SLA; KST
Turner, Wiley B.	WFO
Tuchey, Ellsworth B.	WFO

(Some names are unavoidably held over till next week)

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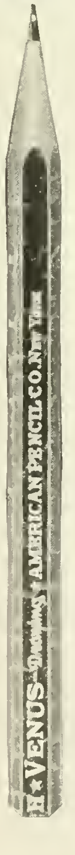
AMERICAN made, these famous pencils set the standard for the whole world.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6B softest to 9H hardest
& hard & medium copying

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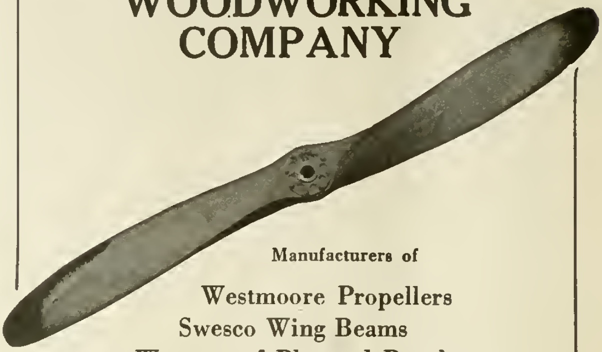

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Cabinet makers with over thirty years' successful business behind them

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912, of AERIAL AGE WEEKLY, published weekly at New York, N. Y., for October 1, 1918, State of New York, County of New York, ss: Before me, a Notary Public, in and for the State and county aforesaid, personally appeared G. Douglas Wardrop, who, having been duly sworn according to law, deposes and says that he is the Business Manager of the AERIAL AGE WEEKLY, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, Aerial Age Co., Inc., 280 Madison Avenue, New York; Editor, Henry Woodhouse, 280 Madison Avenue, New York; Managing Editor, G. Douglas Wardrop, 280 Madison Avenue, New York; Business Manager, G. Douglas Wardrop, 280 Madison Avenue, New York.

2. That the owners are: (Give names and addresses of individual owners, or, if a corporation, give its name and names and addresses of stockholders owning or holding 1 per cent or more of the total amount of stock.): Aerial Age Co., Inc., 280 Madison Avenue, New York; Henry Woodhouse, 280 Madison Avenue, New York; G. Douglas Wardrop, 280 Madison Avenue, New York.

3. That the known bondholders, mortgages, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholders or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the six months preceding the date shown above is: (This information is required from daily publications only.)

G. DOUGLAS WARDROP,
Business Manager.

Sworn to and subscribed before me this 27th day of September, 1918.

(Seal) JOHN J. HALEY,
Notary Public, New York Co., No. 18.
(My commission expires March 30, 1920.)

VICTORY'S CHARIOT
Member of Manufacturers' Aircraft Association, Inc.
BUY LIBERTY BONDS
Thousands of Standard workers are doing their utmost to hasten the coming of Victory and the new era.
STANDARD
AIRCRAFT CORPORATION
ELIZABETH NEW JERSEY
A REAL FIGHTING INDUSTRY!

(*Continued from page* 216)

wholly conclusive as to the special value of these connections, and further tests are contemplated.

D. *Characteristics of constructive materials.*—A number of tests on materials entering into aeroplane construction have been made, and in pa ticular satisfactory progress is reported in the development of a cotton substitute for linen aeroplane fabric. (See Report No. 22, pt. 1.) An extended investigation has also been carried on relating to the physical characteristics of balloon fabrics and with special reference to the factors which enter into the strength, durability, and gas-tightness of such fabrics. Specifications for balloon fabrics have been furnished to the Army and Navy covering fabrics of the same general type as are now being used, and with the addition of certain refinements relating to uniformity of construction and finish considered from the viewpoint of the influence of the fabric on the gas-retaining properties of the rubber film. (See Report No. 22, pt. 2.) A considerable amount of experimental work has also been carried on in connection with the physical properties of light alloys adapted to aeronautic construction, and also types of alloy steel. This investigation is continuing, and report in detail is not available for inclusion in this report.

E. *Generation of hydrogen.*—Satsfactory progress of a confidential nature has been made by the Bureau of Steam Engineering of the Navy Department in connection with the installation of hydrogen plants aboard ships.

F. *Standardization of specifications for materials.*—The Joint Army and Navy Technical Board, which was organized on recommendation of the Advisory Committee, is engaged with this problem, and substantial progress has been made.

The International Aircraft Standards Committee, with which this committee is working in full co-operation, is also actively engaged in the work of developing satisfacory standards for international adoption at the forthcoming conference to be held in London, and definite progress is anticipated along these important lines.

Appropriations for the Fiscal Year 1918

The appropriation "National Advisory Committee for Aeronautics, 1917-18" carried in the naval appropriation act approved March 3, 1917, is as follows:

> For scientific research, technical investigation, and special reports in the field of aeronautics, including the necessary laboratory and technical assistants; traveling expenses of members and employees; rent (office in the District of Columbia, not ot exceed $1,500); office supplies, printing and other miscellaneous expenses; clerks; draftsmen; personal services in the field and in the District of Columbia: *Provided*, That the sums to be paid out of this appropriation for clerical, drafting, watchmen and messenger service for the fiscal year ending June 30, 1918, shall not exceed $12,000; in all, $107,000.

This appropriation became immediately available upon the passage of the act, and, added to the continuing appropriation of $5,000 a year for five years, carried in the act establishing the committee, made a total of $112,000 available for the fiscal year 1918.

In order to provide funds for the completion of the committee's research laboratory, the following amendment to the above appropriation was contained in the urgent deficiency act approved October 6, 1917:

> National Advisory Committee for Aeronautics: Such portion of the appropriation "National Advisory Committee for Aeronautics" carried in the act making appropriations for the Naval Service for the fiscal year ending June thirtieth, nineteen hundred and eighteen, approved March fourth, nineteen hundred and seventeen, as may be necessary, not to exceed $40,000, is made available for the completion of the committee's research laboratory now under construction, and for the construction of additional buildings necessary in connection therewith.

Estimates for the Fiscal Year 1919

The following estimates of expenses for the fiscal year 1919 have been submitted by the committee in due form:

> For scientific research, technical investigations, and special reports in the field of aeronautics, including the necessary laboratory and technical assistants, traveling expenses of members and employees, rent of offices in the District of Columbia, office supplies, printing, and other miscellaneous expenses, equipment, maintenance, and operation of research laboratory, and construction of additional buildings necessary in connection therewith; purchase, maintenance, operation, and exchange of necessary aeroplanes and one motor-propelled, passenger-carrying vehicle; clerks; draftsmen; personal services in the field and in the District of Columbia: *Provided*, That the sum to be paid out of this appropriation for clerical, drafting, watchmen, and messenger service for the fiscal year ending June thirtieth, nineteen hundred and nineteen, shall not exceed $20,000; in all, $260,000.

Conclusion

In conclusion attention is invited to the following:

1. The committee has been in existence about two and one-half years and during that time has carried through and prepared for publication 23 technical reports dealing with various phases of the science and art of aeronautics. It has further been occupied in the design and construction of its first laboratory units at Langley Field, which will be ready for occupancy early in 1918. It has further occupied itself with a great variety of questions relating to the preparations for war and with the various activities which have sprung up as a result of the existing state of war.

2. The plans contemplated for the coming year include:

(*a*) A continuance of the manifold miscellaneous activities resulting from the existing state of war.

(*b*) The completion of the first laboratory units at Langley Field and the installation of the necessary apparatus and equipment.

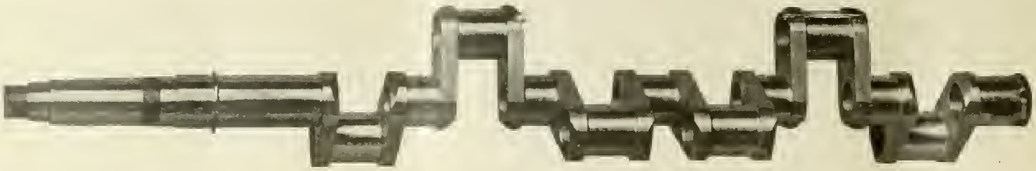
(*c*) The organization of a small scientific staff and the investigation of many important problems relating to the science and art of aeronautics, and with a view to their practical solution and application to the present war demands.

3. The preceding years of the committee's activities must therefore be viewed in some degree as preparatory for the more effective service which the committee hopes to render through its laboratory facilities at Langley Field and through the enlarged technical and scientific staff contemplated in connection therewith.

4. The committee trusts that these opportunities for enlarged service, and with special reference to the present war conditions, may be found an adequate justification for the appropriation herein requested.

Respectfully submitted.

W. F. DURAND, *Chairman.*



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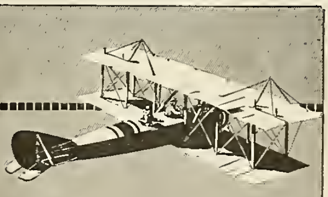

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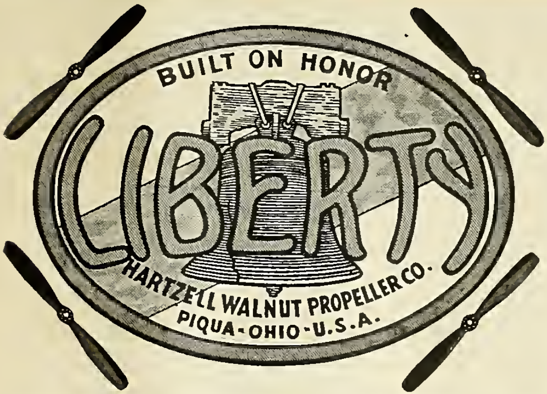

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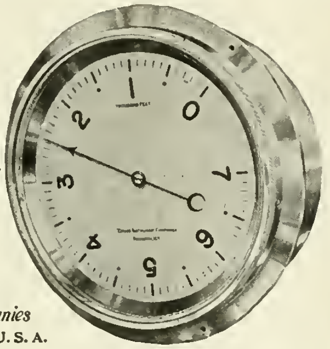

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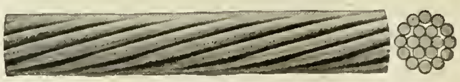

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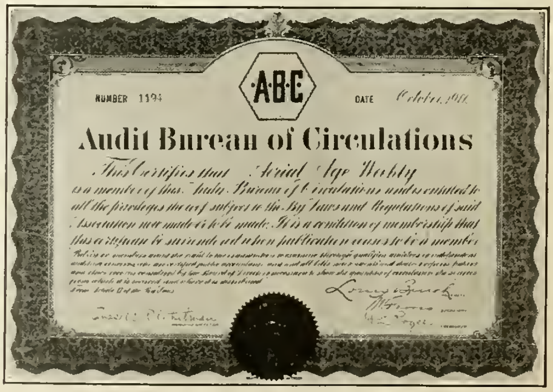

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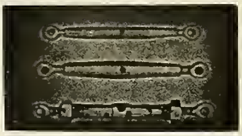

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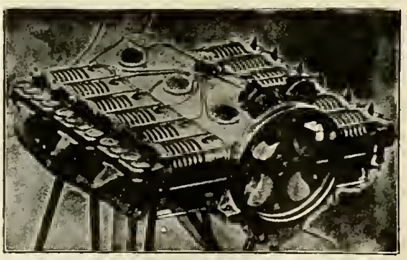

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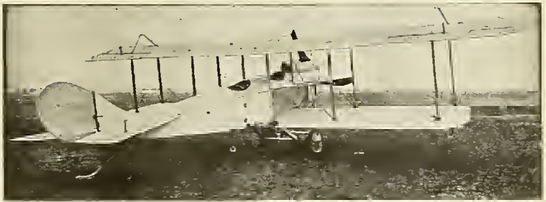

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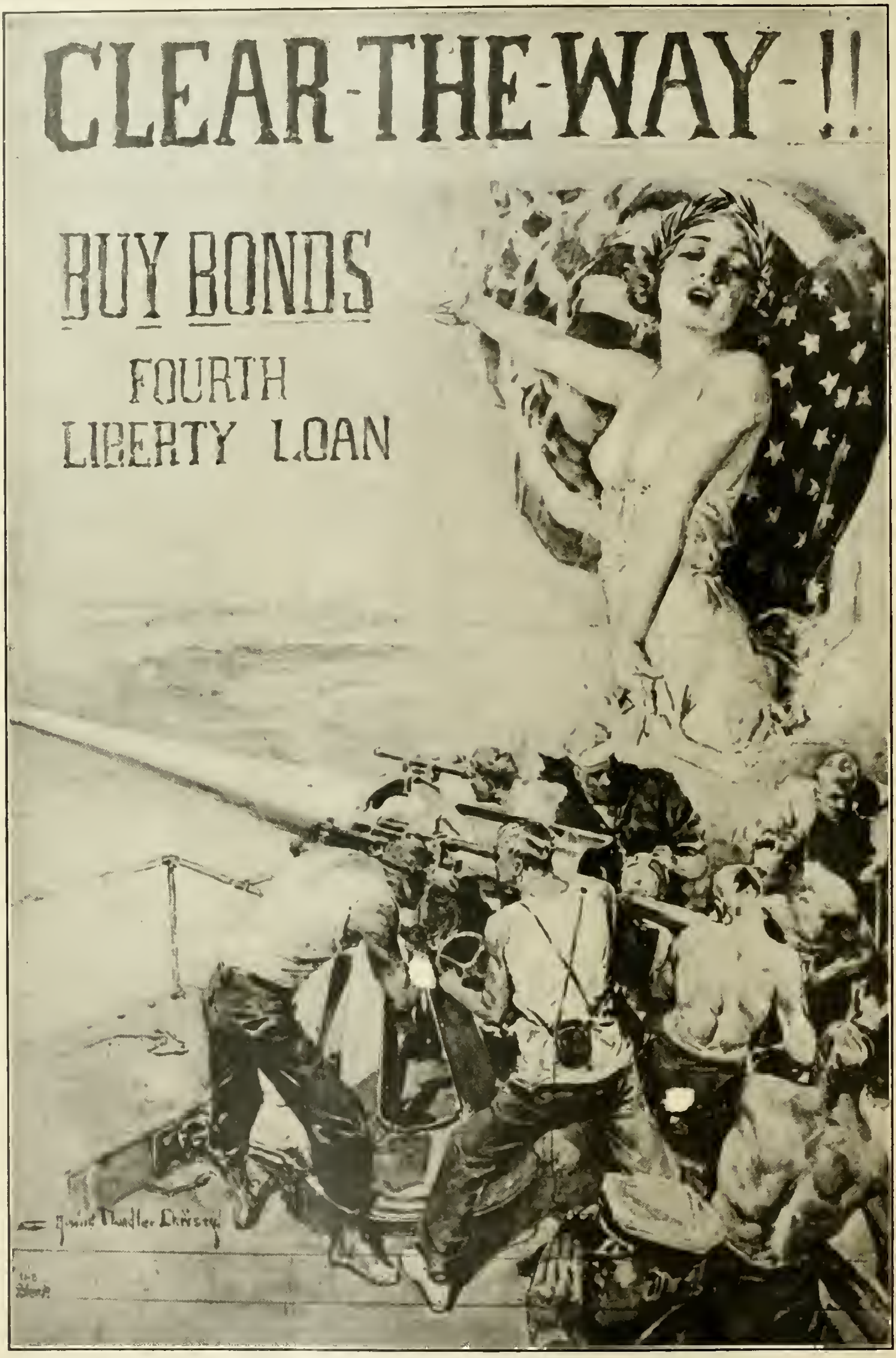

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AERIAL AGE
WEEKLY

Vol. 8, No. 6 OCTOBER 21, 1918 10 CENTS A COPY

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SHED WEEKLY BY THE AERIAL AGE COMPANY, INC., FOSTER BUILDING, MADISON AVENUE AND FORTIETH STREET, NEW YORK CITY
Entered as second-class matter March 25, 1915, at the Post Office at New York, under the act of March 3rd, 1879

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Used on U. S. Naval Hydroplanes, where Absolute Dependability is Imperative

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HALL-SCOTT MOTOR COMPANY
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WASHINGTON NAVY YARD
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Oct. 23-24, 1917

LANGLEY FIELD
May 15, 1918

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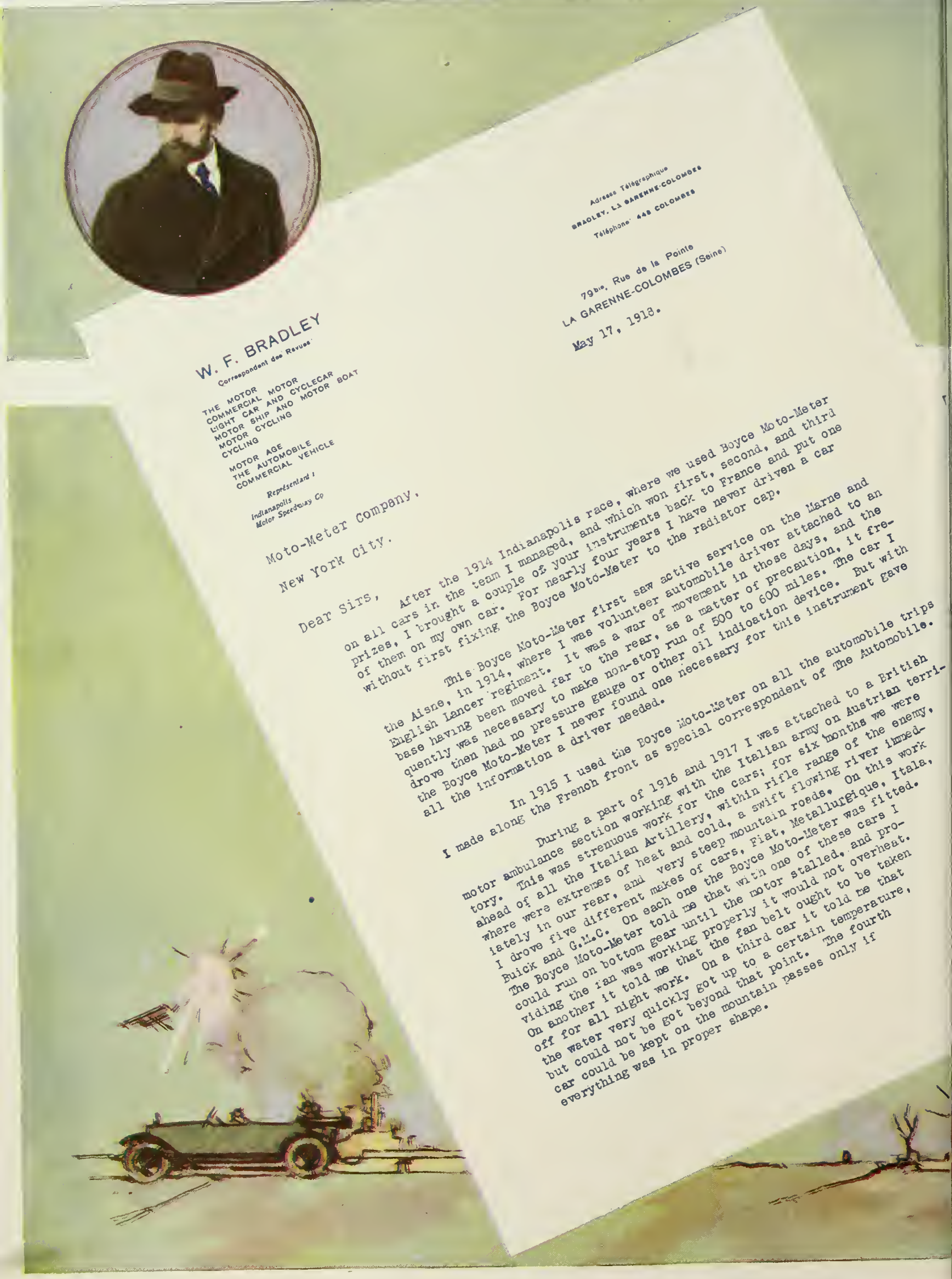

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May 17, 1918.

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Dear Sirs,

After the 1914 Indianapolis race, where we used Boyce Moto-Meter on all cars in the team I managed, and which won first, second, and third prizes, I brought a couple of your instruments back to France and put one of them on my own car. For nearly four years I have never driven a car without first fixing the Boyce Moto-Meter to the radiator cap.

This Boyce Moto-Meter first saw active service on the Marne and the Aisne, in 1914, where I was volunteer automobile driver attached to an English Lancer regiment. It was a war of movement in those days, and the base having been moved far to the rear, as a matter of precaution, it frequently was necessary to make non-stop run of 500 to 600 miles. The car I drove then had no pressure gauge or other oil indication device. But with the Boyce Moto-Meter I never found one necessary for this instrument gave all the information a driver needed.

In 1915 I used the Boyce Moto-Meter on all the automobile trips I made along the French front as special correspondent of The Automobile.

During a part of 1916 and 1917 I was attached to a British motor ambulance section working with the Italian army on Austrian territory. This was strenuous work for the cars; for six months we were ahead of all the Italian Artillery, within rifle range of the enemy, where were extremes of heat and cold, a swift flowing river immediately in our rear, and very steep mountain roads. On this work I drove five different makes of cars, Fiat, Metallurgique, Itala, Buick and G.M.C. On each one the Boyce Moto-Meter was fitted. The Boyce Moto-Meter told me that with one of these cars I could run on bottom gear until the motor stalled, and providing the fan was working properly it would not overheat. On another it told me that the fan belt ought to be taken off for all night work. On a third car it told me that the water very quickly got up to a certain temperature, but could not be got beyond that point. The fourth car could be kept on the mountain passes only if everything was in proper shape.

BOYCE MOTO METER

Moto-Meter Company

(2)

The fifth car was inclined to overheat whenever it was taken away from the level roads. Without the Boyce Moto-Meter all these cars would have been treated alike; either the water would have boiled or it would not have boiled.

All five cars were hit by shell splinters. One had to be abandoned on the field. Another was partially buried when a big shell brought down a house outside of which it was standing. But the Boyce Moto-Meter never was damaged and was brought back by me when I left the Italian front for France.

Last summer I joined the American Air Service in France and again put the Boyce Moto-Meter on active service. It made several trips from the heart of Italy over the Alps to Northern France, and had been used constantly in France. It gave us the information that a certain fleet of cars ought to be run all the winter and most of the spring without fan belts and with one third of the radiator covered. Until the Boyce Moto-Meter was fitted all these cars had been running cold and inefficient. The Boyce Moto-Meter gives indications quicker and more accurately than the most experience'driver can detect them by the feel of the car. In my opinion a Boyce Moto-Meter ought to be fitted to every truck and car on war service. It is the only indispensible accessory.

For work aloft a Boyoe Moto-Meter is even more necessary than on the road. Changes of temperature and atmospheric conditions are so rapid that the pilot must be kept informed of the temperature of his motor. Only by this instrument and shutters over the radiating surface can the pilot k
is motor in the best condition ready to respond to the immediate calls h
ave to make on it. The pilot is risking too much when he relies on "feel
tell him the condition of his motor.

Yours faithfully,

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WHETHER the engine is gliding smoothly over city pavements far from the smoke of battle, or whether it is struggling over shell-torn roads in the war zone, it is constantly subjected to excesses of heat and cold.

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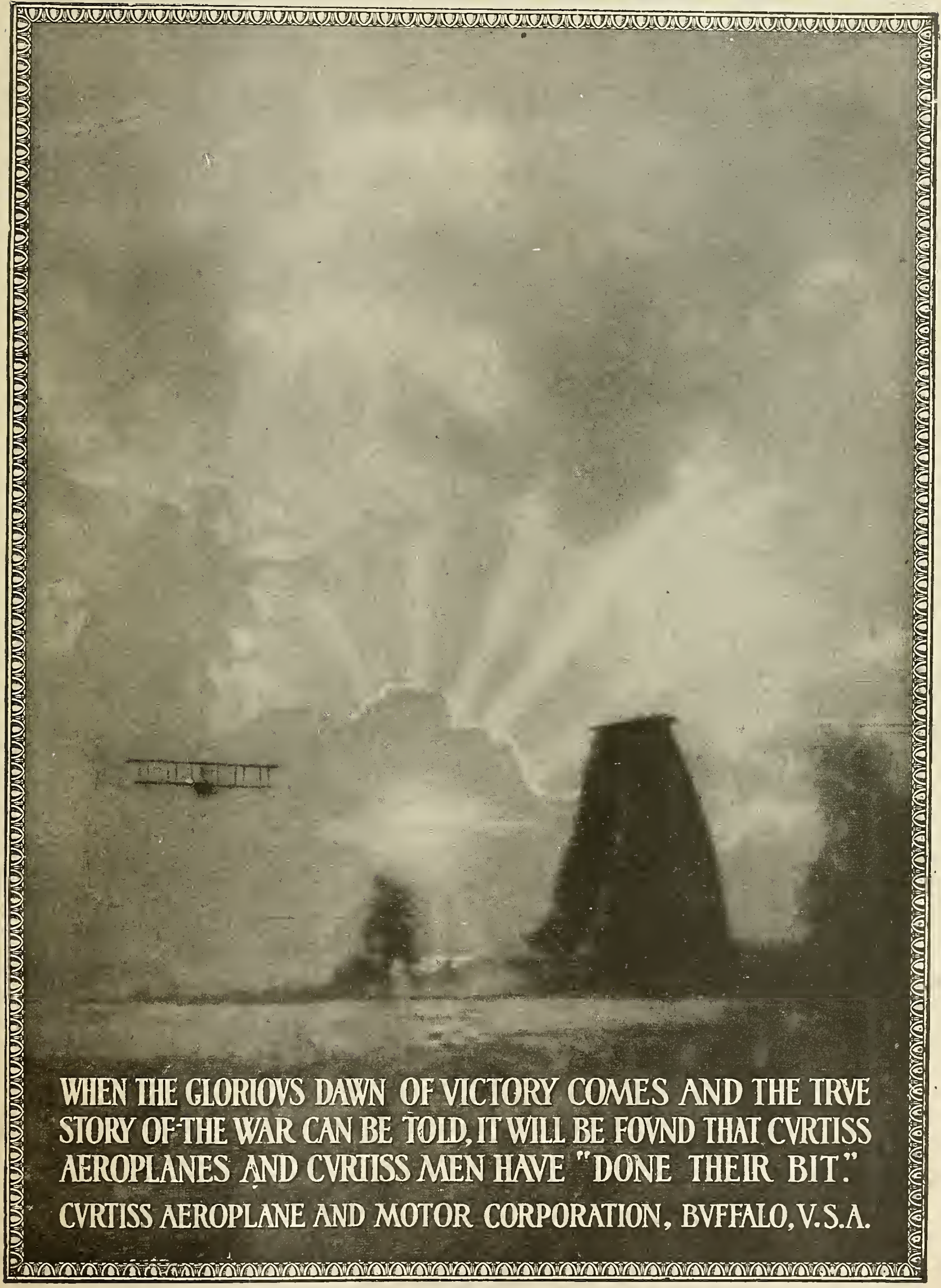
Harrison Boyce

THE MOTO-METER CO., Inc.
Long Island City, New York, U. S. A.

BOYCE
MOTO METER



WHEN THE GLORIOVS DAWN OF VICTORY COMES AND THE TRVE STORY OF THE WAR CAN BE TOLD, IT WILL BE FOVND THAT CVRTISS AEROPLANES AND CVRTISS MEN HAVE "DONE THEIR BIT."

CVRTISS AEROPLANE AND MOTOR CORPORATION, BVFFALO, V.S.A.

MANUFACTURERS AIRCRAFT ASSOCIATION INC.

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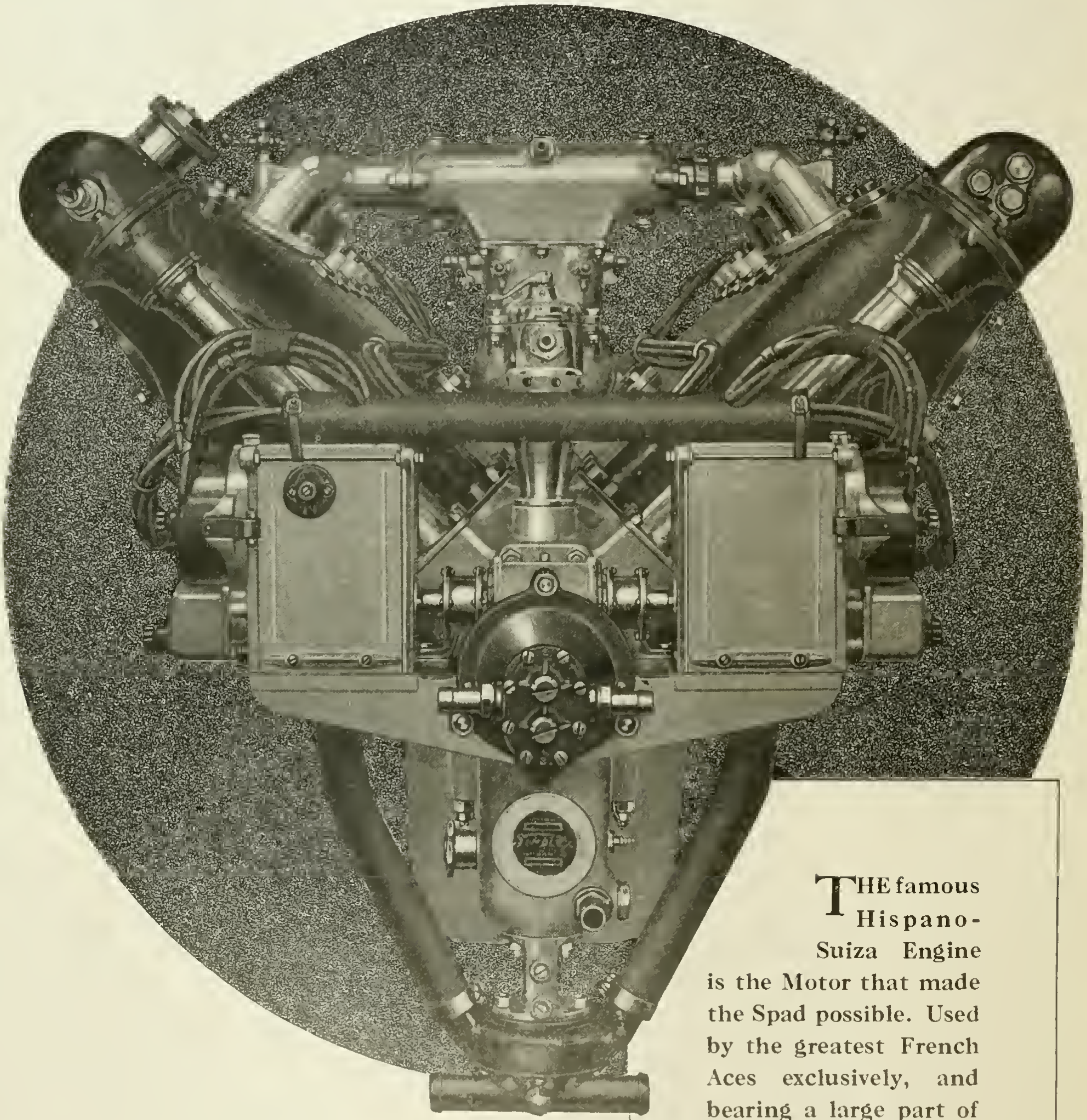

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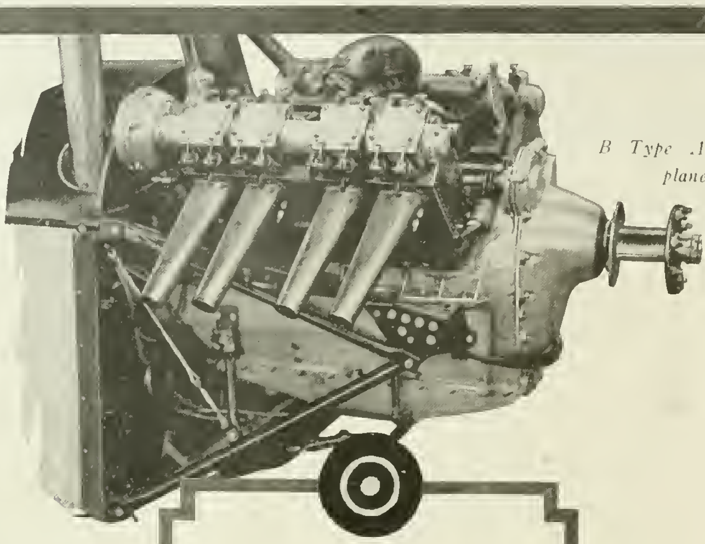
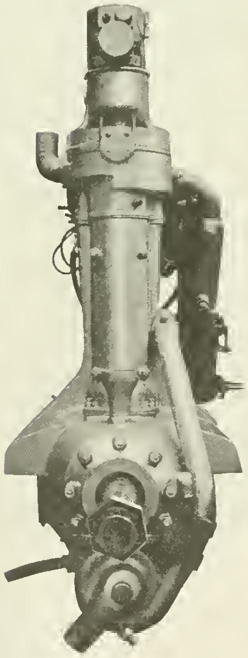


B Type Aeromarine Airplane Engine



Front View L Type Aeromarine Airplane Engine

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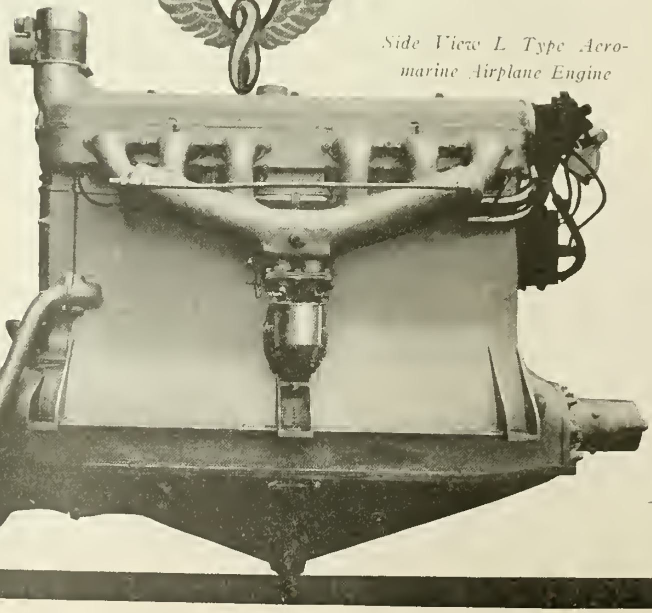

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(This Advertisement Contributed by AERIAL AGE WEEKLY)

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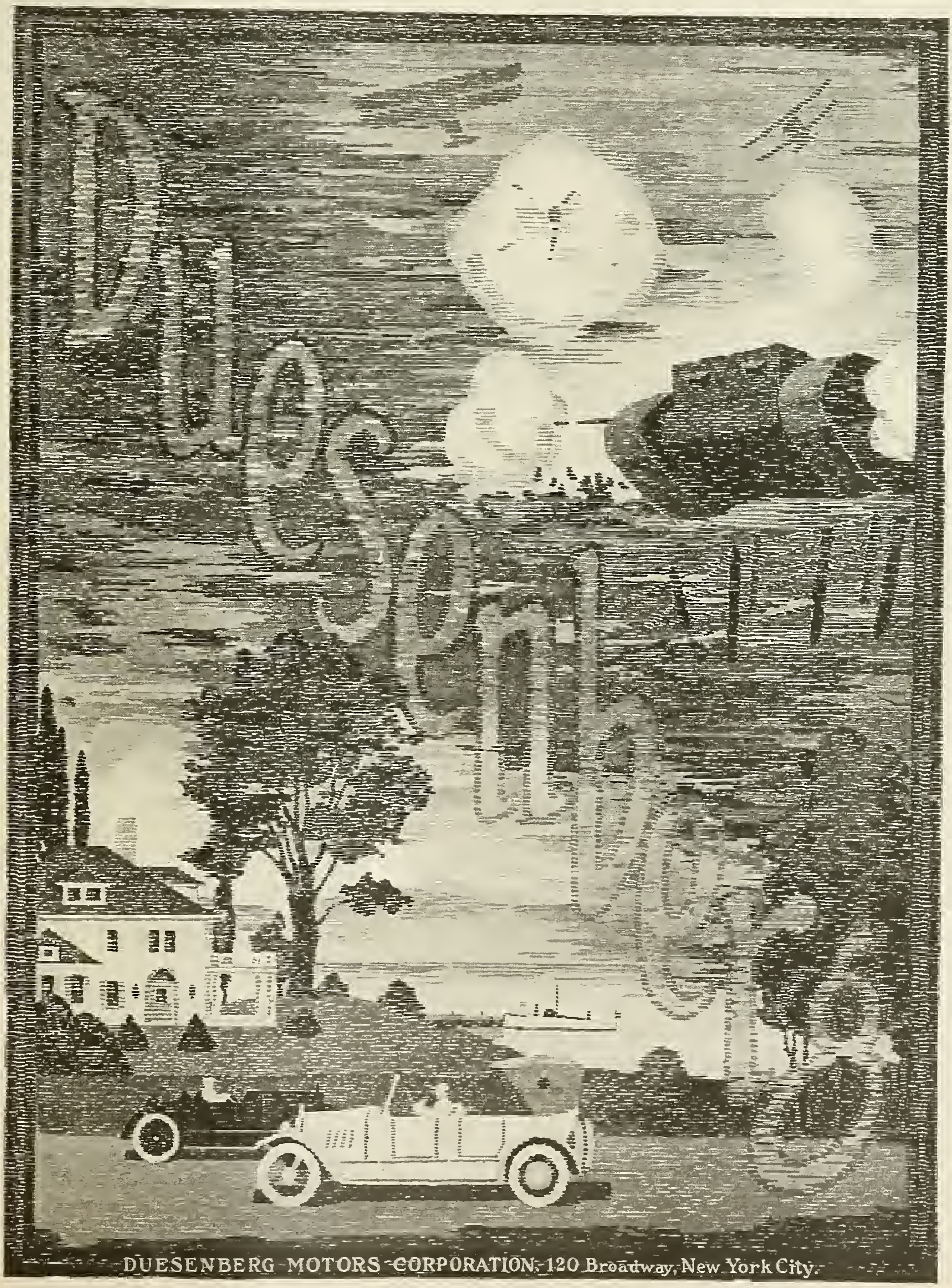
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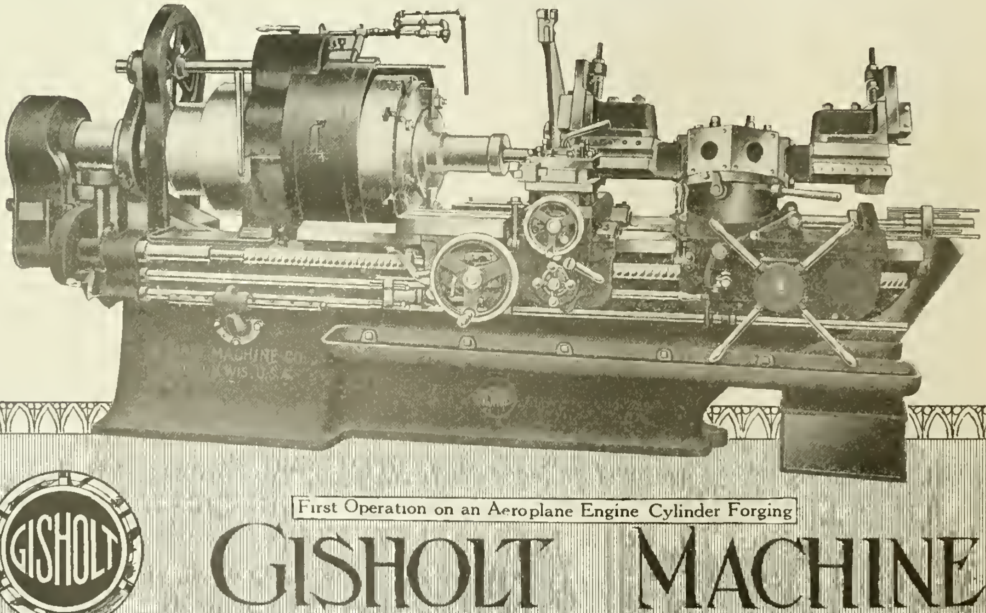

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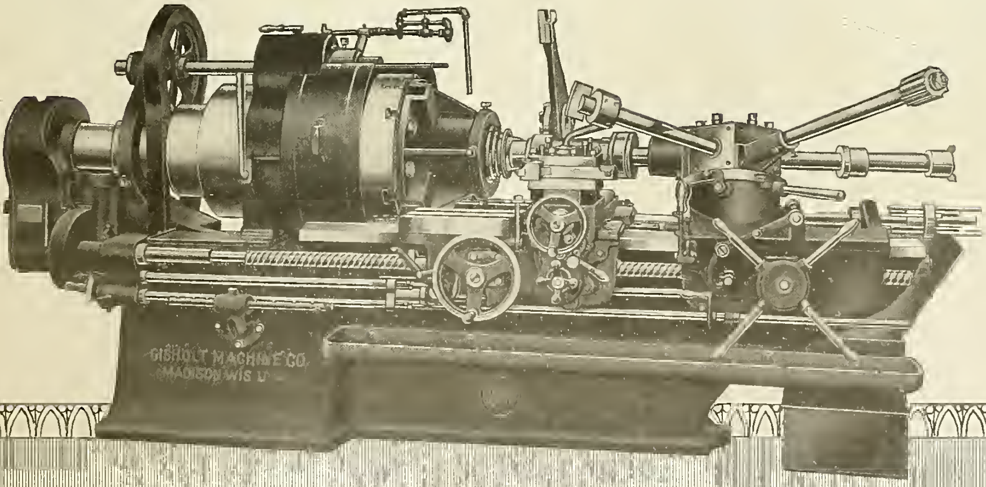

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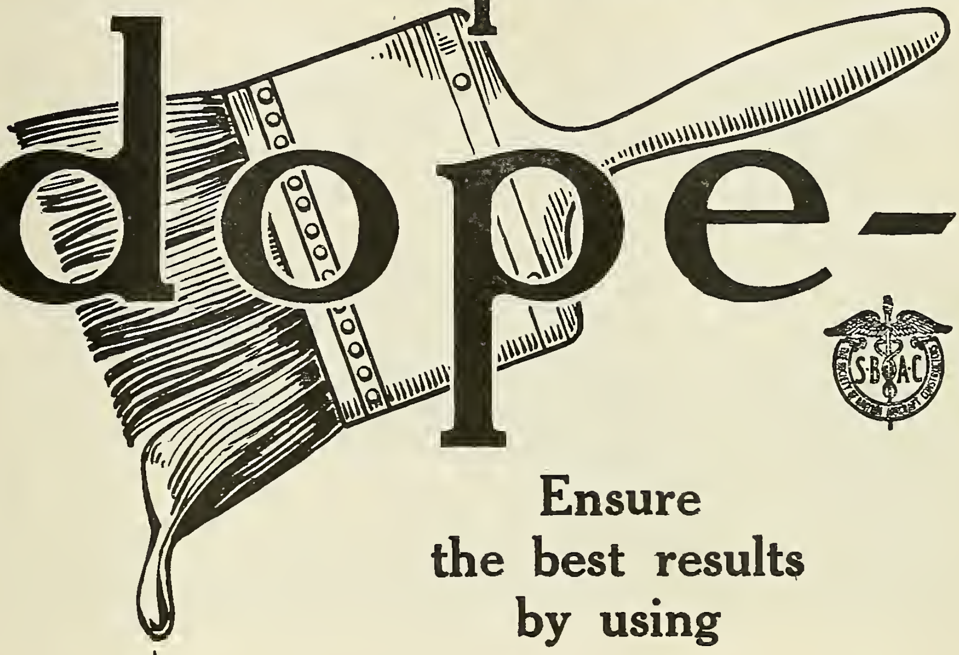

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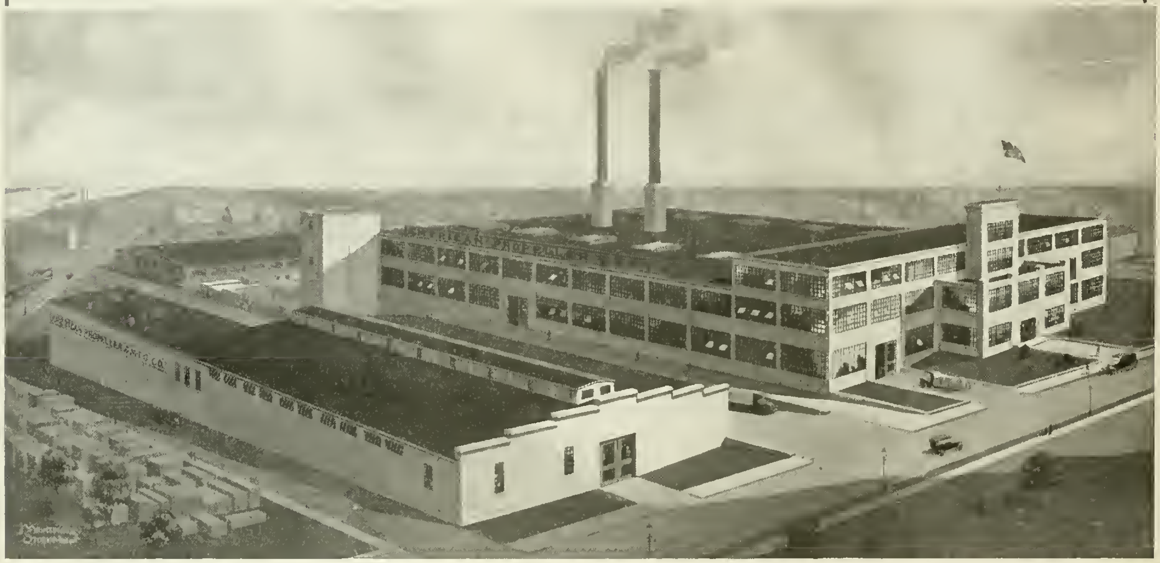

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Contractors to U. S. and all Allies. Our product is known.

American Propeller & Mfg. Co.

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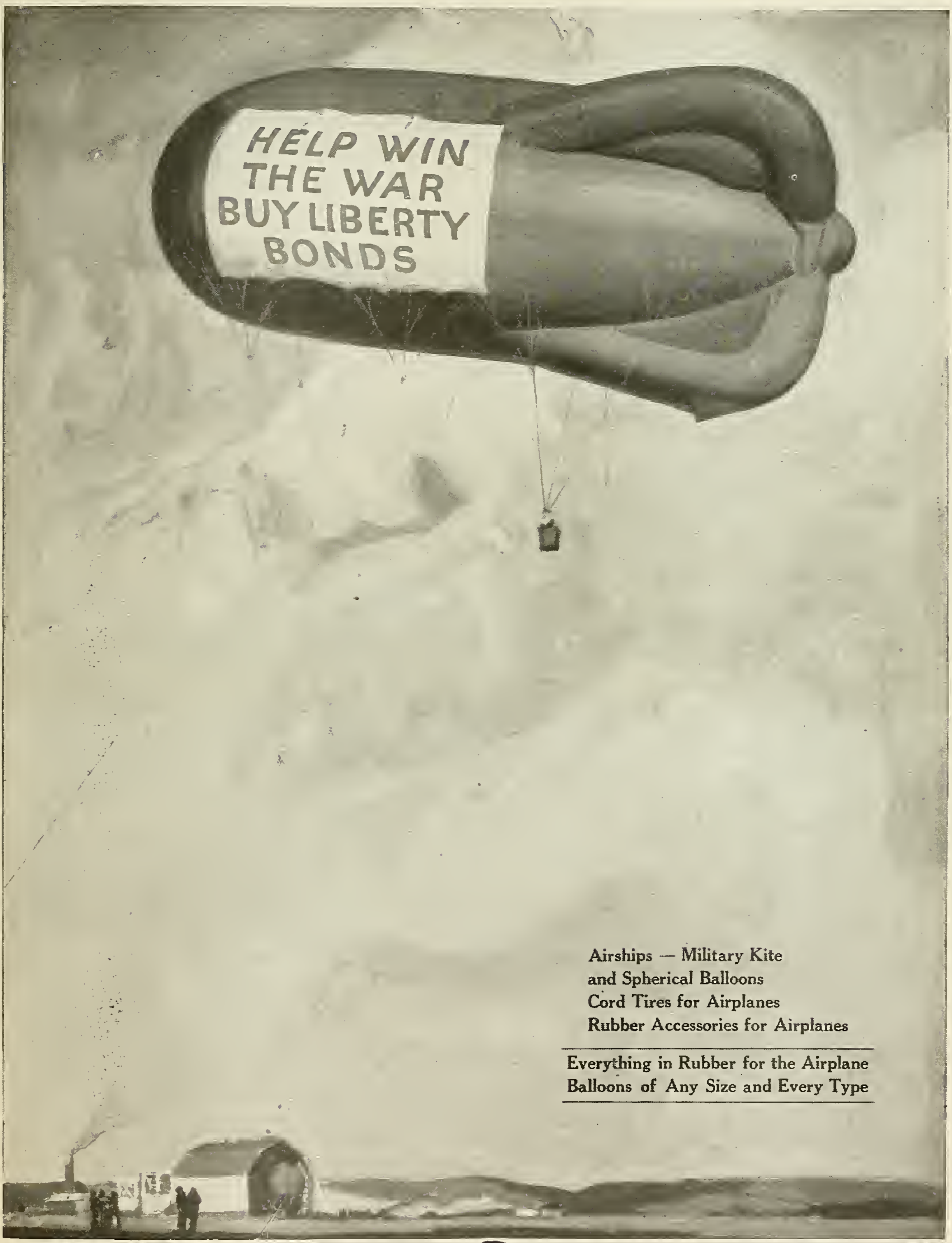
Spencer Heath, President. J. M. Creamer, Vice-President.



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Be SURE. See that your electrical apparatus is "NORMA" equipped.

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1790 BROADWAY NEW YORK
Ball, Roller, Thrust, Combination Bearings

"NORMA"
PATENTED

AERIAL AGE
WEEKLY

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NY MOTORISTS
Known Principles
Hall-Scott, Oakland Made Engine, Given Signal Honor
Propeller Hub Are of Local
Honored.
The True Story of the Liberty Motor
Greatest and Most Powerful Engine Produced on a Quantity
AIR MOTOR CREDIT GIVEN CALIFORNIA
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FRENCH PRAISE LIBERTY MOTOR
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THE success of the Liberty Engine—from the standpoint of performance—is acknowledged both at home and abroad.

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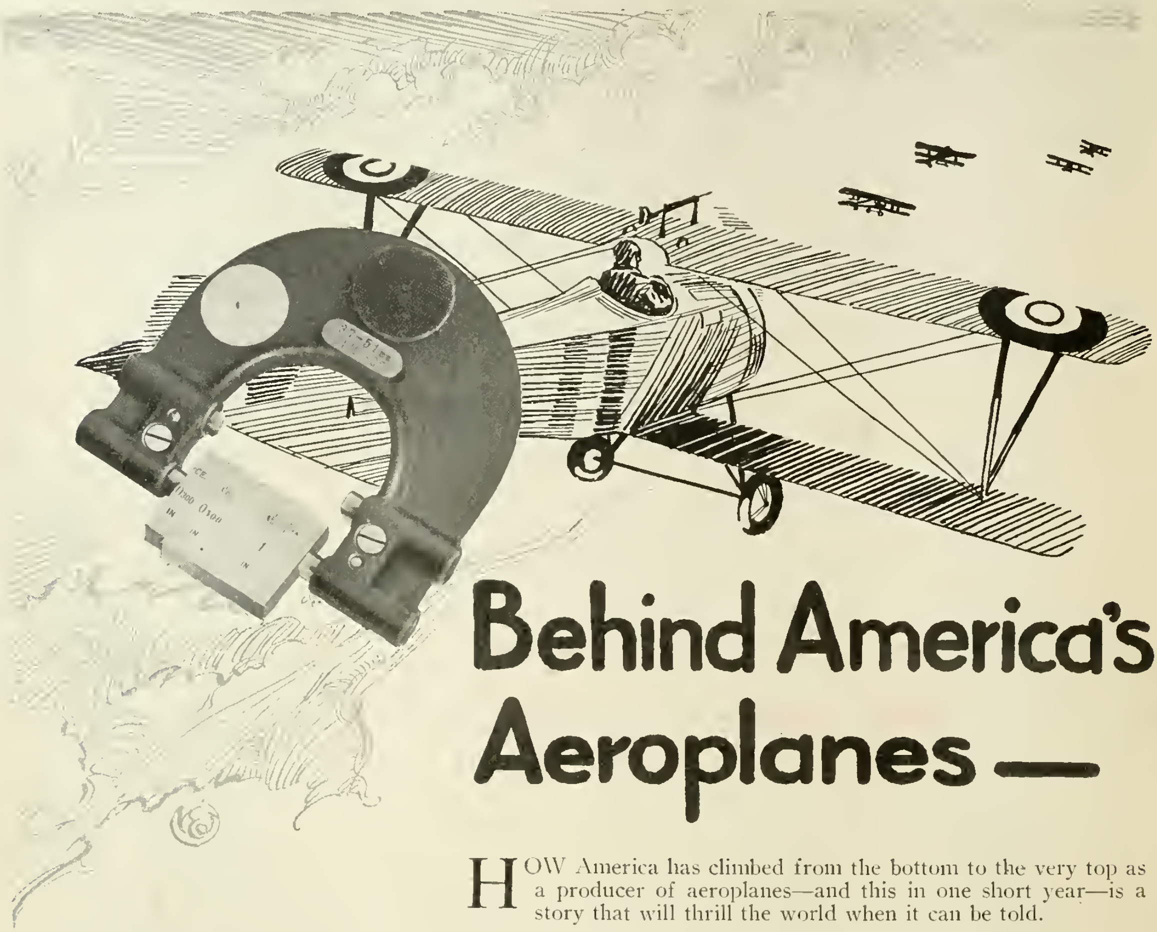

Behind America's Aeroplanes —

HOW America has climbed from the bottom to the very top as a producer of aeroplanes—and this in one short year—is a story that will thrill the world when it can be told.

The reason that she has been able to do this can be summed up in one word—INTERCHANGEABILITY.

But back of interchangeability stands the thing that alone can make it practicable—the LIMIT SYSTEM.

And back of the limit system, LIMIT GAGES.

Johansson Limit Gages are in extensive use by practically all builders of aeroplane engines.

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WEEKLY

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VOL. VIII NEW YORK, OCTOBER 21, 1918 NO. 6

UNCLE SAM, WE ARE HERE!

By HENRY WOODHOUSE

WHEN Uncle Sam finally saw the importance of striking Germany through the air, in the summer of 1917, and he wanted to place orders for about 25,000 aeroplanes, 40,000 motors, and the necessary equipment to build a real Air Service, he looked around and found a very meager aeronautic industry—meager because there had never been enough business on which to develop.

Then Uncle Sam called on the other industries for help and their answer was like General Pershing's answer when he landed in France. General Pershing said: "Lafayette, we are coming." The industries said: "Uncle Sam, we are coming."

On July 14th, 1918, General Pershing went to Lafayette's grave and said simply "Lafayette, we are here!" Only four words, but much more eloquent than a book.

Now that American battleplanes equipped with Liberty and Hispano-Suiza engines are actually helping the Allies advance, and, as the War Department announces, 6,600 training planes and 12,500 training engines have been produced, the Aeronautic Industry can say: "Uncle Sam, we are here!"

The next step will be to say: *"Uncle Sam, we are there!"*

This will happen soon. The shipments of planes and motors are increasing more and more substantial—and Second Assistant Secretary of War John D. Ryan will soon return from overseas with intimate knowledge of the quantity of aircraft and motors wanted, and a man-size aircraft program can be expected.

The $2,000,000,000 Aeronautic Industry of the United States

Over two billions of dollars are being spent in aeronautics in the United States. The Army in the past fifteen months was allowed by Congress a total of $1,672,000,000 for aeronautics. The naval appropriations and the orders from the Allied countries bring the total to over two billions of dollars.

To this stupendous sum will, no doubt, have to be added at least another billion dollars in the near future, because it is being realized that the number of aircraft required to prepare to win the war is much larger than was realized before.

It is generally admitted that the least that the United States can plan to do is to put and keep five thousand aviators on the fronts. This means training twenty-four thousands and supplying 118,000 aeroplanes and a minimum of 250,000 motors in one year. And propellers, radiators, magnetos, carburetors, instruments, etc., in proportion.

As was testified before the Senate Committee on Military Affairs last March by officers, and again last July, forty per cent of the aviators at the front must be replaced monthly. The replacements in machines is one hundred per cent monthly. In other words, to keep 5,000 aviators at the front for one year we must supply 24,000 aviators and 60,000 aeroplanes.

As it takes an average of two aeroplanes to train a military aviator the total aeroplanes to be supplied in a year to keep 5,000 aviators at the front would be 108,000.

About 20% of these aeroplanes will have to be single motored combat or advanced training machines; 30% will be single or double motored machines used for scouting, directing artillery fire, aerial photography, contact patrol and short distance bombing. The other 50% will have to be long distance bombing type machines as large as can be obtained. The larger the machines used for night bombing are, the greater the load of bombs they can carry. Therefore they cannot be too large.

This does not include any contribution to the Allied aircraft programs, which must be considered.

Allies Will Take Everything the Aeronautic Industry Can Produce

The Allies will take everything the aeronautic industry can produce—and more!

This is true of engines, of aeroplanes, of parts, of instruments and devices and of raw materials.

Great Britain, Italy and France have asked for thousands of motors. Great Britain has the planes ready for the motors, and the aviators ready to fly the machines and there is general regret that we cannot supply them as fast as needed because those idle planes and aviators could do wonderful work for the cause of civilization.

Able Men in Charge of Aircraft Program

The men in charge of production and operations in the U. S. Army and Navy Air Service are energetic men who can be counted upon to go as far as the official aircraft program permits them to go without delay.

The size of the program itself is, of course, the deciding factor. For this reason there is hope that during their last trip overseas Secretary of War Baker and Second Assistant Secretary of War John D. Ryan have had opportunity to go over the aeronautic subject thoroughly and that they will make recommendations to Congress for an adequate program, which will take into consideration the facts given in the first part of this article regarding the necessity of making provision for the monthly replacements in aviators and machines.

The Future of the Aeronautic Industry

To answer the query regarding the future of the aeronautic industry we must look into the future just as we looked into the future two years ago, or six and eight years ago, and try to estimate the changes which may be expected in the world's affairs from the present extraordinary situation and the possible development in size and employment of aeroplanes. I have already discussed this subject twice in the editorial pages of AERIAL AGE in the past two months and a detailed article appeared in *Flying* for October.

The duration of the war is the first thing to be considered. A war of such magnitude as the present war cannot end like a summer shower. It is more likely to smoulder on for years like a forest fire, because even if Germany should propose peace under conditions entirely favorable to the Allies, it would not be wise to discontinue the work of preparedness or to stop the manufacturing of war materials, because our enemy is a treacherous enemy and cannot be trusted. Therefore the manufacturing of war materials may be expected to continue for probably a year after the negotiations for peace begin.

Supposing the war lasts another two years—and that seems to be the absolute minimum. Considered from the standpoint of two years hence, and with two years in which to develop commercial aeronautics and establish aerial mail lines across the continent, across the Atlantic, in South and Central America, Canada, Australia and other countries where aerial transportation will solve some of the great difficult problems of transportation, we can expect to be able to use 50 per cent of the entire output of aircraft for commercial purposes. This may be true if every effort is made in the meantime, beginning right away, to develop the aerial mail service.

If the war lasts three years longer, and every effort is made in developing the aerial mail service, when the war comes to an end not less than 70 per cent of the aeroplanes being built today can be used for the maintenance of our national defences and the aerial mail and express service.

If the war lasts four years and every effort is made, the entire output of our factories can be utilized entirely for transportation and maintenance of our national defences.

Just as those of us who worked for the building of our air forces pointed out in 1914, 1915, 1916 and 1917, that a substantial aerial mail service would build up a powerful reserve of trained aviators and develop valuable aircraft manufacturing facilities which would be available for national defence in case of need, we must today recommend this same measure to protect the welfare of this country and safeguard civilization.

It is hardly necessary for me to point out that now that we have aeroplanes capable of lifting fifteen tons and going at a speed of about 100 miles per hour, and the Air Service comprises over 10,000 aviators, and the non-flying personnel numbers over 100,000 men, the general application of aircraft for transportation is to come fast.

The delivery of mail across the Atlantic and across the continent may be as common next year at this time as the delivery of mail by aeroplane on the New York-Philadelphia-Washington route is today. The mail will be much heavier over long distances, because then the aeroplane will make it possible to make deliveries a number of days sooner.

By demonstrating that mail can be sent from Chicago to New York by aeroplane in eight hours the Post Office has emphasized the military and commercial value of a permanent aerial mail line between New York, Cleveland and Chicago.

Government orders, specifications for war materials, contracts, bids, authorizations of various kinds can be sent by aerial mail at a saving of over one day. This means truly a day gained in the production of the things needed to win the war.

It means that the regular office correspondence which, in accordance with business routine, is mailed late in the afternoon in New York will reach Chicago the following morning, thus saving a full day. By the fastest train it would only arrive there twenty-four hours later, too late to be attended to that same day.

Makes Quicker Train and Boat Connections

The initial saving of one day in the transmission of mail from Chicago to New York and vice versa is greatly increased when the letter is destined to make train connections for the West or the North or boat connections for Europe or South and Central America and the Pacific possessions and China and Japan.

Then it means a saving of days and weeks.

$50,000,000 Worth of Aerial Mail Business Waiting Development of Aerial Mail Service

To run a single line across the Atlantic will mean sending out two large aeroplanes every hour, with relays from Newfoundland to the Azores and from the Azores to Portugal, England and France. As they will be large machines, it will keep a large factory busy to supply the machines for a single line.

This will be equally true if the line is to be direct from the United States to Ireland, using large flying boats which may land at intervals to get fuel.

Here are a few points worthy of special consideration:

(1) If we all help the Post Office, within twelve months a dozen additional aerial mail lines can be established, and the Post Office will be able to send by aeroplane at least half of the one hundred million day and night letters and of the fifty million special delivery letters that are being sent each year in the United States.

(2) The day and night letters average close to $1 each, and special delivery letters thirteen cents each, making a total of over fifty million dollars' worth of business which is waiting for the development of the aerial mail service.

(3) Aerial mail day letters are most effective within distance of 400 miles. Night aerial mail letters are effective over any distance, because the aeroplane can carry mail over 1,000 miles between 6 P. M. and 8 A. M.

(4) The aerial mail system will be much more efficient and cheaper than the present telegraphic night and day letter system can be, because the sender can send a letter written in his office which does not have to be transcribed by an operator, who may make mistakes, and the message will reach the person to whom it is addressed without anybody else reading it, thereby insuring greater privacy. The cost of an aerial mail letter will be only sixteen cents, for which price there can be sent a message that would cost $5 or more by telegraph.

(5) Twenty-five million dollars' worth of parcel post can be sent by aeroplane, and about as much of trans-Atlantic mail.

(6) The Post Office pays eighty cents a pound to steamships of American registry to carry mail across the Atlantic. Charging one dollar per letter sent by aeroplane across the Atlantic, will make mail carrying across the Atlantic and across the Continent a paying proposition even now. The super Handley Page or the 2,100-h.p. Caproni could take easily in the fuselage fifty bags of mail, weighing fifty pounds each, making a total of 100,000 letters each trip.

Passenger Carrying Between New York and Chicago in Six Hours at $150 Per

Passenger carrying between New York and Chicago at $150 each is going to be a fair business proposition. A great many people would be willing to pay even more to cut the journey between the two cities down to six hours. We may predict that within two years we will see air lines between New York and Chicago having to run an aeroplane every half hour, having stations along the route, and having express and "local" service.

I could go on quoting hundreds of possible lines of development, but the above suffice to give a good idea of what we may expect—provided the aeronautic industry give due consideration to the necessity of working for its future. Few manufacturers are doing so at present. Few are taking interest in or supporting the aerial mail service.

AERO CLUB OF AMERICA GIVES $6,000.00 IN TROPHIES AND LIBERTY BONDS TO PROMOTE EFFICIENCY IN U. S. ARMY, NAVY, AND MARINE CORPS AVIATION

THE Aero Club of America announces the gift of $6,000,00 trophies and Liberty Bonds, to promote efficiency in the U. S. Army, Navy and Marine Corps Aviation.

The gift is made under the terms of the will of the late Mr. Samuel Valentine, who was member of the Board of Governors of the Club, and left $10,000.00, to be spent at the discretion of the Board of Governors of the Club, for the development of aviation.

After giving the matter thorough consideration, the Board of Governors of the Club, came to the following conclusions:

(1) That it would prove a great incentive for the development of efficiency in flying, bomb dropping, theoretical aerial combat, scouting, formation flying, and other phases of military and naval aviation, if the thousands of aviators and aviation students, who form the different Army Aviation Wings, and Naval and Marine Corps Aviation Stations, had competition.

(2) It became evident that the best results could be brought about by establishing several trophies to be competed for, under rules to be made by the Military, Naval and Marine Corps authorities, providing a trophy for each of the First and Second Provisional Wings of the U. S. Army, and one for the group of Naval and Marine Corps Air Stations located on the Atlantic Coast; and one for the group of Naval and Marine Corps Air Stations located on the Pacific Coast.

(3) The First Provisional Wing comprises a number of Army Aviation Fields which are separate units. The same is true of the Second Provisional Wing, which comprises a number of Aviation Schools located in the West. The aviators in the First Provisional Wing are mostly men who have had, or are having, advanced courses in military aeronautics. On the other hand, the Second Provisional Wing has more aviators who have not had the advanced courses. This, and the

(*Continued on page* 335)

THE NEWS OF THE WEEK

Officers Permitted to Write for Publication

The War Department authorizes the following statement:

The bar has just been removed from literary effort by persons in the military service. Hitherto, General Order No. 1, January 2, 1918, forbade them to contribute to publications or to accept pay for their writings.

Representations were made to the General Staff that since the universal service idea gathered into the army of the United States all the literary ability in the country below the age of 45, this fund of strength should be as free for use as any other special technical equipment.

It was further pointed out that since soldiers have many periods of leisure, there was no legitimate objection to their employing their spare hours in writing, and that any moneys they might thus secure they might well be permitted to accept; particularly in view of the return to the government in the form of income taxes, and the purchase of Liberty bonds and War Savings Stamps.

The General Staff was sympathetic to this suggestion and a revision of General Order No. 1 was directed. This was a matter of some difficulty, as steps had to be taken to make sure that military writers would not use their freedom for the purpose of making indiscreet utterances or giving out information of value to the enemy.

It was not thought fit that soldiers should enter into competition with the regularly accredited news correspondents; they are, consequently, still forbidden to act as regular contributors of news.

Accredited correspondents are permitted to write criticisms of the conditions and activities they encounter, but this privilege of a free press could hardly be granted to soldiers under discipline. Where they encounter incapacity or injustice they have regular channels already provided for making their complaints to the proper authorities without hindrance from offenders.

The writing of fiction, though forbidden in the original General Order No. 1, had been permitted by a special ruling, but in the new form it is specifically sanctioned. Under "fiction" will be included the drama, motion picture scenarios, and other forms of imaginative expression.

Soldiers may write letters for publication and receive money for them. Literary work of all sorts is permissible, "in so far as it does not interfere with the proper performance of duty and the full observance of discipline."

One necessary and important provision is made that "such matter as relates to the military profession, the war, or to current events" must first be submitted to and approved by the Chief Military Censor, who is also the Director of Military Intelligence, with an office at Washington.

The Censor, it may be stated, believes that the writing gift should be encouraged. It is the best form of propaganda; it keeps alive the interest in individual achievement and point of view; it will bring to light numberless picturesque bits of character and conduct otherwise unchronicled; it offers encouragement to the free expression of the American soul in those hours of its greatest experience.

The new order is dated September 28, 1918, and it is quoted in full for the information of all concerned.

"The Secretary of War directs that these papers be filed in the office of the Adjutant General of the Army, and that an amendment to Section V, General Order No. 1, War Department, January 2, 1918, be published as follows:

"V.—1. All persons in the military service, except those who are duly authorized, are forbidden to utter or publish, whether by speech, writing, print or picture, any true or false report likely to be of use to the enemy, or any criticism of persons in the Government service to the detriment of any department of the Government or to the successful prosecution of the war. This rule applies also to persons not in the military service who may be permitted to accompany any part of the army, save that it is not binding upon authorized correspondents for whose guidance special regulations are provided.

"2. All persons in the military service are forbidden to act as regular correspondents or contributors of news or articles of an informational military nature to newspapers or other periodicals.

"3. Except as above prohibited, and in so far as it does not interfere with the proper performance of military duty and the full observance of discipline, there is no objection to the publication, or to the receipt of payment for, fiction, verse, essays, letters, descriptive or technical articles, pamphlets, books, or illustrations, provided that such matter as relates to the military profession, the war or to current events is first submitted to and approved by the Chief Military Censor, Military Intelligence Division, General Staff.

"4. In the case of troops in foreign territory, the Commanding General of such expeditionary force may establish such modification or further regulations as the situation may seem to him to require.

"The object of this order is to satisfy, as far as is compatible with the protection of military interests, the natural desire of the people to keep in touch with their soldier representatives. It is, therefore, expected that all concerned will comply with both the letter and the spirit of its provisions.

"None of the foregoing applies to press dispatches filed from cantonments or camps by regularly paid newspaper correspondents not in the military service. Their copy will not be censored by military authority, but the camp commander will instruct them that they must rigidly adhere to the requests for secrecy with respect to information of value to the enemy, as defined in the printed card sent out by the Committee on Public Information. On violation of these requests, the offending correspondent will be deprived of the privilege of the camp."

Aviator Garros Is Missing Once More

Paris.—Lieutenant Roland G. Garros, a French aviator well known in the United States, who escaped last February from a German prison and rejoined his aerial squadron, has again been posted as missing after a recent flight across the German lines.

Garros figured in many aerial competitions in America in the pioneer days of aviation. At one time he held the record for altitude. He appeared in meets in New York and Southern cities, as well as in Cuba and Mexico. Garros was born at Cape Town, South Africa, of French parents, in 1885.

Air Service Age Limit 56

An announcement issued by the Air Service Officer Headquarters of the Eastern Division of the United States Army, states that the War Department through a special ruling has raised to 56 the age limit for men who desire to enlist in the Air Service.

Major Willard Wadsworth, Department Air officer in New York, in commenting on the ruling, said: "Heretofore we have been reluctantly compelled to turn down applicants who were more than 46. The majority of those rejected were skilled men, and the service has suffered a distinct loss as a result of our inability to enlist them. It is hoped that they will reapply for enlistment."

The announcement also stated that applications are again being received for commissions as pilots, bombers, observers and balloonists. Applications may be filed at 104 Broad Street.

Aeroplane Takes Piano from London to Paris

Paris.—One of the new large Allied bombing planes has brought from London a full-sized upright piano, landing in Paris safely.

The aeroplane can carry six persons and a large quantity of bombing explosives, but this

At the Aerial Gunnery School at North Island, Cal. From clay pigeons the student advances to machine guns until he can bag a Boche in the air. Here is shown one of the latest types of machine guns

weight measured in pounds was not readily comprehended, and it was determined to bring over a piano as clear evidence of the machine's capacity.

"Roosevelt Field" Honors Quentin

In memory of Quentin Roosevelt the new third field at Hempstead, L. I., has been named Roosevelt Field. It has had no name heretofore, as it has been completed but a short time.

Germans Use Fire Bombs

Paris.—The Germans during the last few days have been using in their air work a new type of inflammable bomb, combining great effectiveness with light weight. A single aeroplane, it is said, can carry 200 of these bombs.

The only way of fighting the fire caused by this new form of destructive weapon appears to be the isolation of the blaze. as pouring water on it is literally adding fuel to the flames on account of the chemicals of which the bombs are composed.

New Air Feat by Fonck

Paris.—Lieutenant René Fonck, according to an announcement made here on October 9, recently brought down four German aeroplanes within twenty minutes on the same day.

Fonck is now credited with seventy official victories, and has actually brought down 109 German machines.

Sold Guynemer's Glove

Lieutenant Bagues, at a Liberty Loan concert in the Metropolitan Opera House on October 9, as a last touch of sentiment, auctioned off a glove of the famous "ace," Guynemer, given by the airman to Mme. Purbau. The glove brought $1,250,000. The Travellers' Insurance Company and National Biscuit Company combined to buy the trophy.

Provisional Wing at Park Place Is Named for First Flying Surgeon

The home of the Second Provisional Wing at Park Place has been officially named Ream Field, in commemoration of the first flying surgeon of the Air Service, the late Major William R. Ream.

Notification of the new designation, decided upon by the Director of Military Aeronautics, was received at the field October 1 and read to the officers.

Major Ream was flight surgeon of the British-American "flying circus," which started from Indianapolis for St. Louis August 24. He was killed that day when his machine, piloted by Lieutenant Wesley Benner, fell 150 feet, the engine having stalled.

Major Ream's home was at San Diego, Cal.—*Tailspins.*

Rickenbacher Gets Two More Planes in Big Air Battle

With the American Army Northwest of Verdun.—October 4 was not one in which conditions were ideal for aviation. At no time was the visibility good, but it was not so bad as to prevent operations by pursuit planes, which set out early upon their task. So active, in fact, were the airmen that the day was the busiest the airmen have had since the Meuse-Argonne offensive started.

It was hardly daylight when the aviators began operations. Soon a squadron of five Americans fought a battle with seven German machines near Fleville, in which the Americans brought one of the enemy down. Later in the morning three German aviators were reported to have been brought down by anti-aircraft guns, while in the afternoon four others were reported down within the American lines from similar means.

The Germans attacked American balloons along the front repeatedly. In most instances the anti-aircraft fire drove off the enemy planes. In a number of instances pursuit planes protected our balloons from the Germans.

On Thursday evening Eddie Rickenhacher brought down two German aeroplanes. He finished the first quickly and then tackled the second.

Lieutenant J. C. Vaseonoelos, of Denver, was the star of the day on Friday, although he brought down only one aeroplane. He was engaged with Rumpler and Fokker and shot down the latter west of Apremont. The lieutenant returned to the aerodrome with scores of bullet holes through the wings of his machine.

Just before nightfall eight American pursuit planes encountered more than twenty-five enemy machines beyond the lines while on a balloon shooting expedition. Though the Americans had accomplished their mission, when they ran onto the big German squadron a fight followed which lasted more than fifteen minutes, but when it was concluded five of the enemy planes were downed and all but one of the American squadron were on their way home, safe.

To Increase Balloon Personnel

The War Department authorizes the following:

Owing to the increased demand from the American Expeditionary Forces for balloon crews, the Balloon Corps of the Army is to be increased 25,000 men and 1,200 officers. It now numbers approximately 11,000, all ranks. Authority has been obtained by the Air Service from the General Staff to induct men of draft age and to transfer officers from the other branches of the service. This increase will create many vacancies in the grades of colonel, lieutenant-colonel, major, captain and lieutenant. Enlisted men and civilians who apply for officers' examinations will be required to take the cadet course of from three to five months, and training camps for this purpose will be conducted this winter in the South and on the Pacific Coast. The schools already established for this purpose are located at Old Point Comfort, Virginia; San Antonio, Texas; and Arcadia, California, near Los Angeles.

In addition to the important rôle played by the balloon in the control of artillery fire, it is now being used with infantry, a caterpillar mount for the winch by which the balloon is controlled having been successfully used on the front. This portable winch makes it possible for balloon companies to even keep up with infantry advances for observation and direction of attack.

In addition to the opportunities for immediate promotion, officers who join the balloon service will receive the benefit of flying pay when they actually do the work of observers and make flights in connection with army operations. Flying pay is 25 per cent of the base pay of an officer.

W. K. Vanderbilt Dined by Flyers

Paris.—William K. Vanderbilt was presented on October 4 with the rosette of an officer of the Legion of Honor at a banquet given him as Honorary President of the Lafayette Escadrille, in the founding of which he aided. The presentation was made by Jacques L. Dumesnil, Under Secretary for Aviation.

American Ambassador Sharp, ex-Premier Viviani, Brigadier General Patrick, U. S. A., and members of the escadrille were present.

Major Edmund L. Gros, Chief Liaison Officer of the American Aviation Service, an organizer of the escadrille, and Captain Thereault, its original commander, were highly praised for their work in founding and organizing the Flying Corps.

Each member of the escadrille present was given a service ribbon and a silver clasp in the shape of an Indian head, the emblem of the escadrille.

Work of American Balloon Companies on French Front

The War Department authorizes the following:

An American officer of the Division of Military Aeronautics, just arrived from overseas, reports that in the beginning of the recent offensive one American balloon company, with about 170 men and its equipment, was in Chateau-Thierry three hours after the infantry had occupied the place. It had a balloon up the following morning five miles beyond the village and was observing for American artillery with a complete line of communication established.

Another balloon company, a few hours behind the first, nevertheless got into action quick enough to bring down an enemy plane with a captured machine gun, and for the service rendered on this occasion was cited in the French Army orders. For this exploit each member of the company hereafter has the privilege of wearing a green and white cord looped over the right shoulder of his uniform.

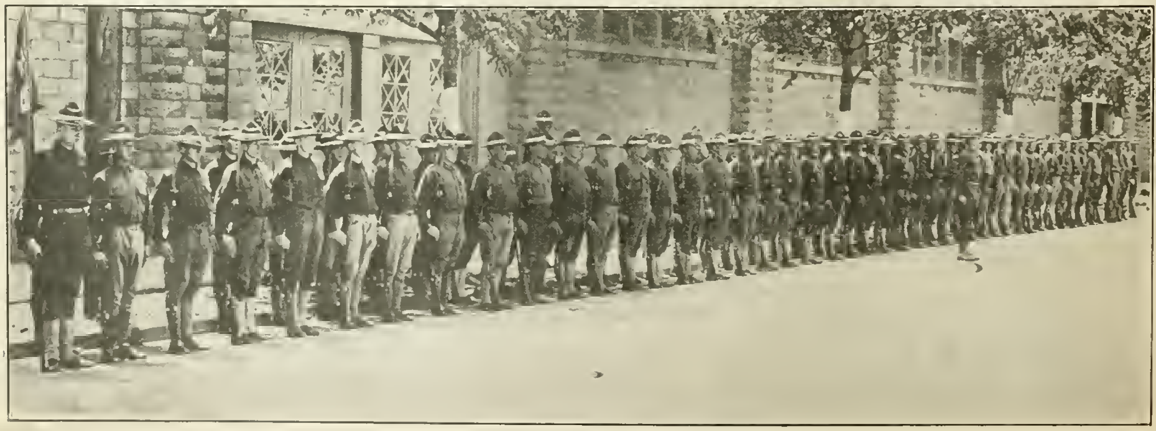
On one edge of a wood, about fourteen acres in area, another American balloon company in this sector was so heavily shelled that it had to haul down its gas bag. In a remarkably short time, however, it had transferred its equipment to the other side of the forest and went on making observations uninterruptedly. The officer said that this forest had been used by the Germans as an ammunition dump and that this balloon company had so many souvenirs that an order had to be issued to prevent the men from loading their souvenirs in the trucks, otherwise there would have been no room for the balloon equipment.

This officer reported American balloons, manned by American crews trained in this country, on the line and doing good work. The balloon crews were becoming proficient in parachute jumping. In this, he said, there was plenty of action all the time. He said that the American balloon companies favored putting two men in a balloon basket rather than one, as was the custom with the French and English.

Need More Aviators

The needs of the fast-moving program of the Air Service, today more than 160 times greater in respect to personnel than it was when war was declared, require a number of additional men, according to Colonel Shields, Acting Executive of the Division of Military Aeronautics. Irrespective of status in the draft, the Air Service has been reopened for induction of mechanics and of candidates for commissions as pilots, bombers, observers, and balloonists, after having been closed, except for a few instances, for the last six months.

In announcing the opportunity for service in the aviation section, officials disclosed the completion here of twenty-nine flying fields, 1,200 de Haviland planes, 6,000 Liberty motors, parts for the first heavy night bombers, 6,600 training planes, and 12,500 training engines. Civilians have not been given an opportunity to qualify as pilots since last March. During last Fall and early Winter a reservoir of more than 6,600 prospective fliers, accepted by the examining boards, had been built up, but this has since been gradually drawn off through graduation.



Student Aero Squadron at Camp Dick, after one week's training

NOTHING MORE GRATIFYING TO THE NATION THAN TO KNOW THAT THE AIRCRAFT INDUSTRY CAN SAY: "UNCLE SAM, WE ARE HERE!"—*Governor Charles S. Whitman of New York.*

GOVERNOR WHITMAN and Mrs. Whitman were among the earliest advocates of aerial preparedness. By his addresses, and communications to the Aero Club of America, Governor Whitman advocated speed in developing substantial Air Forces. Mrs. Whitman, it will be recalled, was one of the first hundred American women to fly. Even Miss Olive Whitman, the charming little lady shown in the photograph by her little brother, contributed to the campaign for aerial preparedness and for the aerial coast patrol. In 1915 she christened the flying boat "N. Y. N. 1," which was presented to the New York Naval Militia by Mr. Glenn H. Curtiss, through the Aero Club of America. This gift, and other contributions from patriotic people, made it possible to train 300 aviators at private expense which were taken over by the Army and Navy and were the first American aviators to go overseas when war was declared.

Mrs. Charles S. Whitman has been very active in war work and State Organizations. She is connected with the following organizations:

Aerial League of America (Honorary Member), Aviation Committee, National Special Aid Society, American Red Cross Canteen Service for Albany, Camp Upton Community Hall Committee, Central Christian Mother's Union, Citizen's Committee for the Conservation of Children of America During the War, City Federation Hotel (stockholder), Committee for the Protection of French Soldiers Reforme No. 2, French Aerial Warfare Committee (Honorary Member), Infant Welfare Station, Little Mothers' Aid Association, Militia of Mercy, National Aeronautic Committee, National Child Labor Committee, National League for Women's Service, National Security League, New York State Conference of Mothers, New York State Committee on Women in Industry of the Council of National Defense, New York State Congress of Mothers and Parent Teachers Associations (Advisory Board), Red Cross (Kenwood Branch), Salvation Army War Work Committee, Seaside Home for Crippled Children, Soldiers' and Sailors' Club, Stage Women's War Relief, United States Navy League, Vacation Ass'n of the Civic Federation, War Camp Community Service, Woman's Christian Temperance Union, Woman's Liberty Loan Committee, Women's Homeopathic Hospital Unit, Women's Overseas Hospital, Y. W. C. A. War Work Council (Honorary Chairman N. Y. State). Received medal from the Patriotic Committee of New York City Federation of Women's Clubs.

Governor Whitman is Honorary Member of the Aero Club of America, Honorary Member of the Aerial League of America, and of innumerable national and state organizations.

Governor Whitman always believed in the future of aeronautics, and did everything in his power to foster aeronautic progress. In the pre-war days, when even the value of aircraft for military purposes was generally denied; Governor Whitman appreciated the value of aircraft and urged the building of American Air Forces at every opportunity.

It was his valuable and hearty encouragement that helped so greatly to organize the First Aero Company of the New York National Guard in 1915-16, which resulted in giving fifty-four (54) aviators to the United States Army.

When Mrs. William H. Bliss gave $10,000.00 to the Aero Club of America to purchase the first aeroplane for the New York National Guard, and contributions for the organizing of an Aero Company, Governor Whitman and Mrs. Whitman did everything in their power to assist this important development—just as they have done everything in their power to assist the organization of the Naval Aviation Section of the New York Naval Militia.

When the United States entered the war, the United States Army and Navy were able to get at least two hundred (200) men, well trained in aviation, who had been trained at private expense, through the efforts of the Aero Club of America and with the hearty support of Governor Whitman and Mrs. Whitman.

The AIRCRAFT TRADE REVIEW

N. E. J.

Agrees to Build 100 Planes Daily

Toledo, Ohio.—John N. Willys, president of the Curtiss Aeroplane Company, announced here today that he has closed with the Aircraft Board the biggest plane contract ever entered into in this country.

At a conference in Detroit, Willys contracted to turn over one hundred planes a day from March 1 on, provided the Government furnishes motors and other equipment.

Hartzell Walnut Propeller Company Opens Dayton Office

The Hartzell Propeller Co., of Piqua, Ohio, announces that Mr. H. B. Wise, their sales manager, has opened an office in the Mutual Home Building, Dayton, Ohio, to facilitate their intercourse with the various aircraft departments located in Dayton and the Middle West.

Self-Starting Device for Aircraft Motors

Milwaukee.—A starting device for heavy duty engines, designed several years ago by Nels A. Christensen, a noted inventor and engineer of Milwaukee, principally for application to motor fire apparatus and similar purposes, has been refined by him to suit the requirements of aircraft. Several hundred hydroaeroplanes in use at the navy aviation camp at Great Lakes, Ill., have been equipped with the starter. Mr. Christensen personally superintended the installations and made numerous practice flights to demonstrate the efficacy of the apparatus. He is president and general manager of the Christensen Engineering Co., 816 First National Bank Building, Milwaukee.

Planes Coming From Cincinnati

Cincinnati.—The Overmeyer Airplane Mfg Co. has bought three acres of land at the West End and will at once begin the construction of a plant for the manufacture of aeroplanes. It will begin with three large contracts from the Government for war service and will be kept busy on Government and war work during the period of war, but the plans of the projectors are to manufacture aeroplanes for commercial and private use following the close of the war. E. C. Drury, of Philadelphia, is interested in the company.

Aeroplane Plant for Chicago

Chicago.—The Illinois Mfg. Association is negotiating for the erection of an aeroplane plant here.

Olds Will Make Liberty Engines

Lansing.—The Olds Motor Works will soon start production on its initial order of Liberty engines. The first lot of 2,000 kitchen trailers is expected to be delivered during this month. The production of passenger cars is slowly being diminished, and the plant will be entirely on war work by January 1.

Flight Tests of Caproni Plane

Washington.—Flight tests of an American built Caproni aeroplane equipped with three Liberty engines are being held by the Bureau of Aircraft Production. A Caproni plane of this type arrived here October 2 at Bolling Field from Hazelhurst Field, Mineola, L. I., and left the next day for Dayton. This Caproni is one of a few built in United States Government factories for test by American aviators and engineers. The tests are now being made in flights from various fields and will continue to be made until it is decided whether or not to put this particular type of plane in quantity production.

Daily Liberty Output Averages 278

Detroit.—The production of Liberty engines in the several plants that are carrying on this work is rapidly increasing, and during the month of September the total average daily production reached 278. It is expected that during the month of October the total output will touch 3,000 complete engines.

The Ford Motor Co. is the first plant engaged in this work to exceed a production of 100 complete engines in any one day; on September 30 120 engines were turned out. This number is increasing daily. Several of the plants, namely, Lincoln, Ford and Nordyke & Marmon, exceeded their August estimates.

Wilson Made Curtiss Vice-President

Buffalo.—At the monthly meeting of the board of directors of the Curtiss Aeroplane & Motor Corp., Charles Wilson was elected a director and vice president in charge of production. Mr. Wilson is president and general manager of the Wilson Foundry & Machine Co., Pontiac.

Bomber Makes 143 M. P. H.

Washington.—A de Haviland 9 plane equipped with a Liberty engine flew from the McCook Field, Dayton, Ohio, to Bolling Field, Washington, D. C., with no stops in 3 hr. 5 min. The actual flight from Dayton to Washington was 2 hr. 5 min. The distance between the cities is 430 miles with the time of flight 143 m. p. h. The journey was made by Caleb Bragg, civilian pilot, attached to the Engineering Department of the Bureau of Aircraft Production. An engineering officer was the passenger. The pilot traveled by compass at a high altitude and reported no difficulty in holding the course. The plane left for New York. From there it goes on a non-stop flight to Dayton.

Quantity Liberty Engine Production Reached

Washington.—The output of Liberty aeroplane engines is fully up to expectation and has reached quantity production. Aeroplanes are now going ahead rapidly and are being shipped in trainload lots daily. These statements were made by W. C. Potter, Acting Director of the Bureau of Aircraft Production, following his return from an inspection of the factories turning out the planes and engines.

Licenses for Experimental Flight to Be Submitted to Army and Navy

Washington.—Applications for flying licenses to conduct experimental flights must hereafter be submitted to the proper Army and Naval authorities before being filed with the Joint Army and Navy Board on Aeronautic Cognizance, Building D, Sixth and B Streets, Washington, D. C.

Applications should be made either by individuals or aeroplane companies making new types of nay aeroplanes to Capt. N. E. Irwin, U. S. N., Director Naval Aviation Division, New Navy Building, Washington, D. C., and for flying army aircraft to the Technical Section, Division on Military Aeronautics, Dayton.

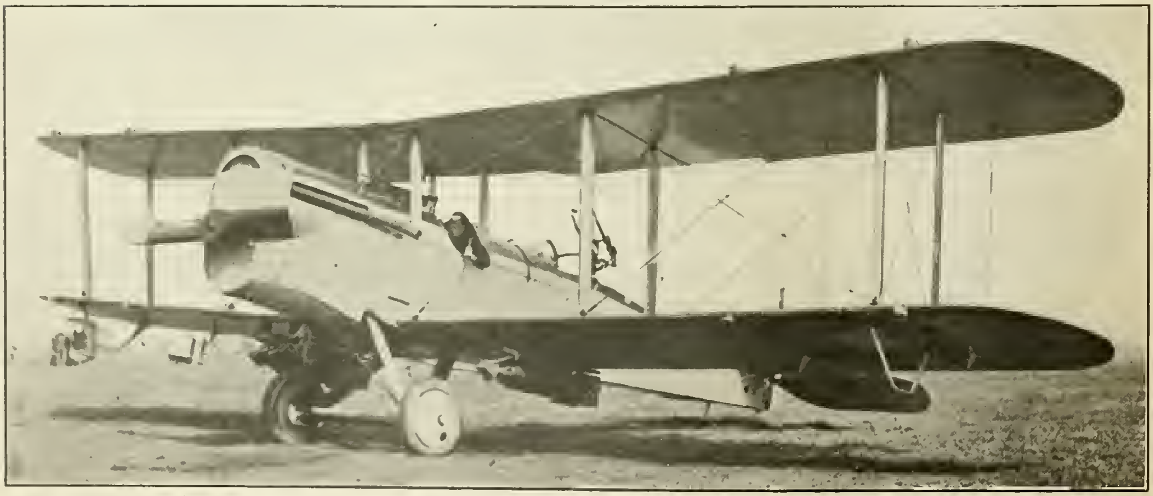
Personal Pars

Horace N. Trumbull, advertising manager of the SKF Ball Bearing Co., of Hartford, Conn., has entered the Reserve Officers Training Camp at New Haven, Conn.

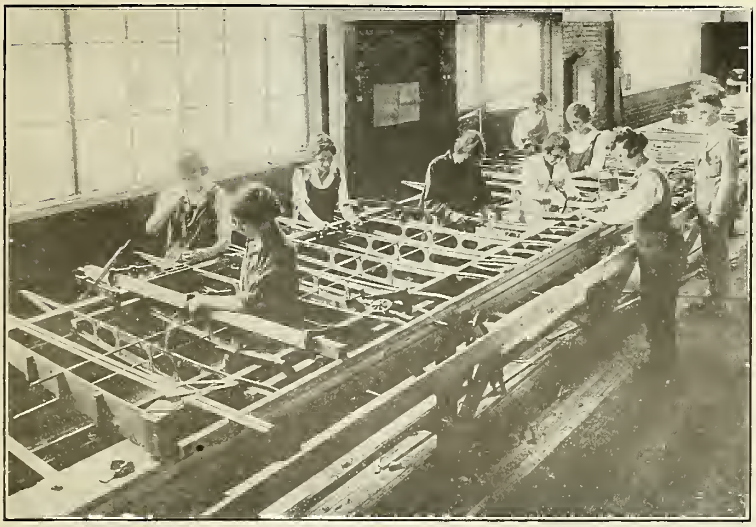
Mr. Byler Advertising Administrator

Robert C. Byler, for nearly four years advertising production man for the SKF Ball Bearing Co., of Hartford, Conn., has been appointed advertising manager of the SKF Administrative Co., of New York City, and will direct the advertising of the SKF Ball Bearing Co., of Hartford, the Hess-Bright Mfg. Co., of Philadelphia, and the Atlas Ball Company of the same city, all of which are controlled by the SKF Administrative Co.

Until arrangements are made in New York City, Mr. Byler will remain with the SKF Ball Bearing Co., of Hartford, Conn.



A De Haviland "four" on exhibition during the recent 3800 mile Western Flight. Lieut. Col. C. K. Rhinehardt, Commander of the First Provisional Wing is shown in the pilot's seat. Night flying lights on the top wings and dummy bombs in the bomb racks, are shown



Women in the Aircraft Industry. Women working on wing manufacture in an American aircraft factory

The First Annual Banquet of the Y. M. C. A. Aeroplane School

The first annual banquet of the Y. M. C. A. Aeroplane School was held in the Oak Room of the Hotel Martinique on Sunday evening, October 6. About one hundred of the students of the school were assembled on this occasion and enjoyed the excellent banquet which was provided and listened to the interesting speeches and talks made by the guests of honor. Mr. Charles Kinsell was toastmaster and introduced the speakers with appropriate remarks. Mr. Charles W. Crossman, the manager of the school, spoke first, and he told of the remarkable growth both in numbers of students and in the equipment which they had provided. He further stated they had 42 instructors and nearly 700 students.

Mr. Crossman gave particular credit to the assistance which the Aero Club of America had rendered both in enabling them to secure motors and apparatus for teaching, as well as aeroplanes which had been donated by the Standard Company and Mr. Irenee du Pont. He stated they had about twenty motors and ten machines.

The next speaker was well known to many of those present and represented the Aero Club of America, Mr. Augustus Post, its Secretary. Mr. Post told the members of the school of the rapid development of aeronautics, and described some of the larger machines and gave the listeners a vivid description of Captain R. W. Schroeder's sensations when he broke the world's altitude record at Dayton, Ohio, and flew to a height of 28,900 feet. He also described the rapid development of the Aerial Mail Service, and from his experiences in the past gave his predictions for the future development of commercial aeronautics and the marvelous achievements which could soon be looked for in this field of aerial navigation.

Captain Oliver J. Gagnier, R. A. F., was the next speaker, and he told about his training in the R. A. F. in Canada and gave some of his experiences at the front. He gave the men a realization of the importance of the work of mechanics in connection with aviation and told how much depended upon their work in keeping the motors in perfect condition. Captain Gagnier represents the Provost Marshal of the British Recruiting Mission to the United States and has seen fighting at the front and has flown all types of British machines.

Other speakers were Mr. Samuel Ecker, formerly Assistant District Attorney; Mr. Adrian Van Muffling, the Chief Instructor of the Aviation Engine Department, and Mr. H. C. Brokaw, the Superintendent of Education.

Les Terribles

(Written exclusively for AERIAL AGE.)

Indians, lumberjacks and farmers from the Northwest made up the bulk of the 32nd division of the American Expeditionary Force in France. They were deployed north of Soissons, with the French army of Gen. Mangin.

The particular job that fell to their share was first, to break the German hold on the Bois Meunière, which they did after six vain attacks. Then they were told to take and hold the village of Cierges—and this they did, after it had changed hands nine times. Later they fought for four days along the Soissons railway. And in consequence they received—individually—many medals, and, collectively, the nickname from the French brothers of the "Les Terribles"—The Terrible—which they prize much more.

There is a division in this country that has orders to deploy on all fronts from September 28 to October 19, to take every village and hamlet, to fight along the railways, and not to let any dollar escape.

It's not a division, either, but an entire army, the A. L. B. B.—American Liberty Bond Buyers.

You are enlisted—don't forget that. So go to it! Put it across with the same fighting spirit that animated the "Indians, lumberjacks and farmers" of the 32nd!

"Les Terribles"—pretty fine nickname, eh? Upstanding and red-blooded-like? Why not earn it on the Fourth Loan?

Aero Carnival at Garden City

Arrangements were completed on Oct. 5th by the U. S. Air Service to stage what will be the biggest aviation carnival ever held. It is being organized by the First Provisional Wing, U. S. Air Service, Garden City, L. I., Col. Claude K. Rhinehardt, commanding, and will be held at Belmont Park on Saturday, October 26th.

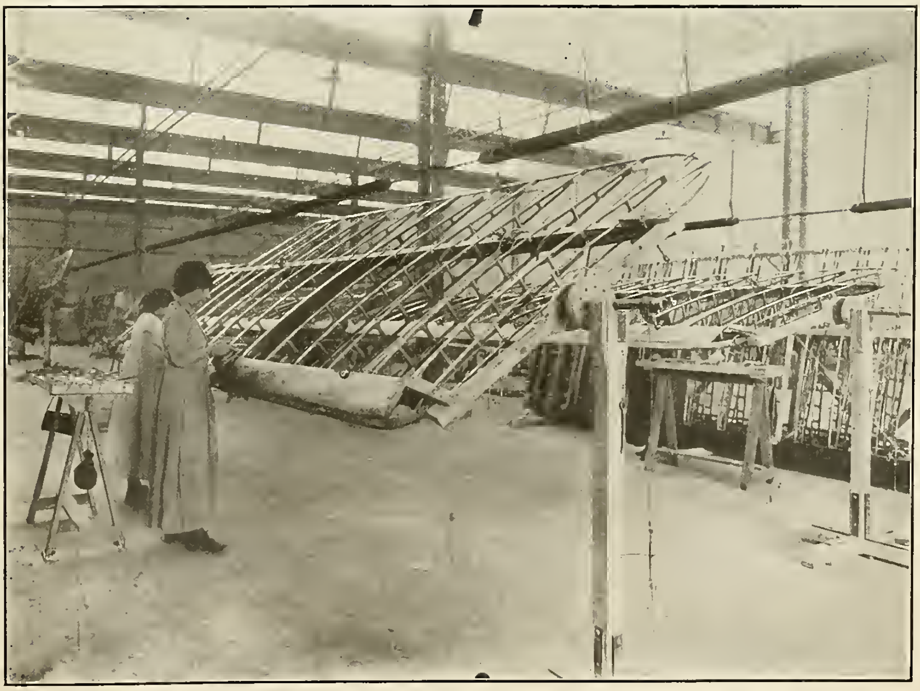
Numerous aero squadrons from the various flying fields and more than 100 aeroplanes of many different types are expected for the huge exhibition. There will be athletic field games, in which flying cadets and enlisted men will compete. There will be solo flying, air stunts, scout plane races, battle-formation flying, motorcycle side-carriers' dispatch races, etc.

The proceeds will be turned over to the National Aeronautic Committee, which is working in association with the War Department Commission on Training Camp Activities and is the only committee recognized by the Commission in aviation work.

Mrs. Charles A. Van Rensselaer is chairman of this committee and Mrs. Clinton Gilbert, treasurer. The funds realized from the carnival will be used for the purchase of athletic equipment, bands' instruments, etc., for our overseas squadrons and training fields in this country, and a portion of the proceeds will be turned over to the committee's fund to provide swimming pools to the Southern training fields. The National Aeronautic Committee is doing excellent work in supplying athletic equipment in a manner that is meeting with the approval of General Kenly, Director of Military Aeronautics. and other high officers of the Air Service.

More than 207 squadrons have been supplied by this committee and 22 flying fields already equipped. However, much more equipment is needed to supply the thousands of men in the Air Service with sporting goods and musical instruments, and the proceeds of the forthcoming meet unquestionably will supply many more equipments.

The carnival is to be a popular-priced affair and an enormous attendance is expected. It will enjoy the patronage of society people and all of the leading Metropolitan Clubs. Numerous features will be added to the program as its organization progresses.



An ingenious mounting of the wing skeleton which makes handling easier and facilitates production

Class in gas engine construction at the Ground School, University of Texas

1,000 Homers Flew Here from Capital

New York.—The War Department released 1,000 pigeons near the Union Station in Washington on September 29 for a flight to New York. The following Sunday 3,000 will be liberated for a similar test. The flights started at 9 A. M., the birds being set free by men from Washington Barracks, under the direction of Major Frank Griffin, head of the pigeon section of the United States Signal Corps.

The first flight is known as the "futurity flight," and the pigeons, under six months of age, were brought from New York Saturday night. They were expected to fly approximately 1,500 yards a minute.

The purpose of these flights is to increase or exercise the "homing" instinct of the birds. In the regular army work a flight such as these is never made, but the birds are released one or perhaps two at a time, with messages.

Travel by Aeroplane

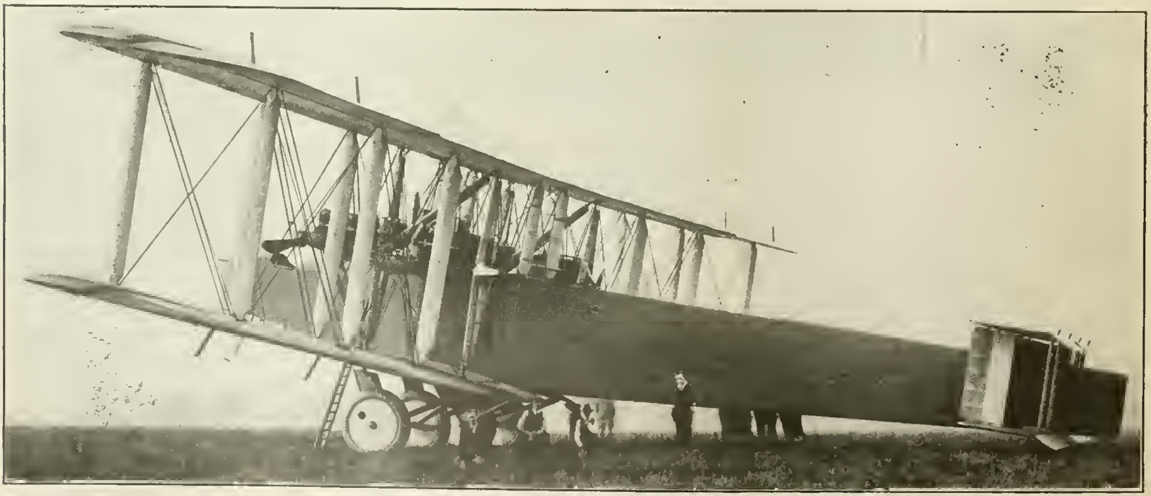
In a recent opinion from the office of the Judge Advocate General, officers travelling by Government aeroplane may draw expenses at the rate of four cents a mile, which is the rate of mileage allowed where the government furnishes transportation by prairie schooners, dog sleds in Alaska, and buffalo carts in the Philippines. The allowance for travel on trains is generally seven cents a mile. The distinction is made, not because aeroplanes are less modern than trains and therefore classed with dog sleds or prairie schooners, but because customarily there are only two methods of transportation used in the service, "train" or "otherwise." Aeroplanes fall in the latter class.

This decision settles a doubt raised in a former opinion that because the aeroplane as used in Military Service was not a vehicle, but an instrument of war, there was no authority for the payment of individual expenses of those using it for travel. Major General Wm. L. Kenly, Director of Military Aeronautics, made the point that although aeroplanes are employed for combat and other war purposes, the use of the aeroplane in the army as a means of conveyance was of constantly increasing importance.

He maintaained that this use was two-fold. First, in the theatre of operations, in connection with troops. Second, outside the theatre of operations, in the transportation of officers travelling without troops, on permanent change of station or temporary duty. In the first case, travel would be performed by aeroplane as it would be by horse, automobile, or other means, and no mileage would accrue. In the second case, travel would be performed by aeroplane in lieu of railway, and mileage, at four cents a mile, should be allowed.

The chief reason for such travel, as maintained by General Kenly, was its expediency. When aeroplanes were available, he believed, they should be used, if only for the sake of practice. There would be no additional expense to the Government in using available aeroplanes for travel, he held, nor any diversion of the time of pilots from their duty. At the same time travel could be accomplished far more quickly than by train, even on short trips, whether for change of station, temporary duty or purposes of inspection. If no mileage was to be drawn for such travel, officers would themselves have to bear the expenses, and if, for this reason, they avoided travel by aeroplane, the result in the long run would be loss of time and loss of opportunity for the full development of the use of the aeroplane.

The point was also made that there was no requirement known where travel must actually be performed by railway to entitle an officer to mileage, and examples were cited to the contrary, found in the Alaskan, Philippine, and Western Service, where, when railroads were not available, mileage had been granted for travel performed by other means of conveyance.



The Handley Page bomber "Langley," equipped with Liberty motors, constructed by the Standard Aircraft Corporation

THE ORGANIZATION IN CHARGE OF AIRCRAFT PRODUCTION FOR THE ARMY

THE organization in charge of producing the aircraft for the Army has, so far, been an organization which had nothing to do with making up the size of the aircraft programme. The duties of this organization have been, and still are, only to carry out programmes as they are made, producing the aircraft as fast as they possibly can be produced.

Second Assistant Secretary of War John D. Ryan, who has just returned to America after an extended trip in England and France

This organization has been, and still is, in the peculiar position that it may be blamed for small production due entirely to outside causes, such as: (a) the smallness of aircraft production; (b) changes in aircraft programme ordered by the authorities overseas; (c) delays due to reaching a decision on the types of aeroplanes to be built; (d) failure to supply newly discovered needs, created by developments in the progress of the war, etc., etc.

Any one of these causes is sufficient to create the impression that this organization is inefficient, when, as a matter of fact, the organization may be most efficient and every one in the organization may be of the very best available.

It has been so in every one of the Allied countries. The organizations in charge of aircraft production have always suffered, the measure of their suffering being decided by the extent of the success on the part of the Germans in the air or in dropping bombs on London or Paris or Venice. The public will not accept justifications or explanations for failure to prevent the Germans from being successful in the air.

When the situation is analyzed, and it is realized that the country would suffer regardless of whether there is justification or not, the public and press can hardly be accused of being too severe.

The same may be true when hundreds of manufacturers are kept working at only part of their manufacturing capacity, although aircraft and equipment are needed in larger and larger quantities. The manufacturers can hardly be blamed for criticizing and the public and press for sympathizing with them.

And yet, in many cases in the past, the organizations in charge of aircraft production were seldom fully responsible for delays and for smallness of production. But that did not save them from the condemnation of the public and the press. In England, from 1915 to the end of 1917, it became so that every time the Germans dropped bombs on London or British soil, or British troops suffered at the front because the British Air Service was not sufficient to maintain absolute command of the air, the press and public would demand the resignation of somebody in the Aircraft Board.

The British authorities connected with aircraft production finally came to the conclusion that as they had to bear the responsibility, and no justifications or excuses were accepted, they would insist on having all the power necessary to make and carry out their own aircraft programme independent of any other organization. This brought about the organization of the British Air Ministry—and solved the problem most completely. The British public and press have not had any serious complaints since. The Air Ministry did make an aircraft programme large enough and, being free to act and having an independent organization, it developed the Royal Air Forces on such a tremendous scale that it provided the aircraft and aviators needed in the supremacy in the air on the British front as well as to protect British soil from German aerial attacks.

The officials in charge of aircraft production in the United States are, in this work, the Bureau of Aircraft Production, and it has the co-operation of a great many able officers of the division of military affairs, some of whom are: Major General William L. Kenly, director Division of Military Aeronautics; Colonel F. R. Kenny, executive officer; Colonel C. G. Brant, Colonel H. H. Arnold, Colonel W. E. Gillmore, Colonel T. H. Bane, Colonel M. F. Davis, Colonel Arthur Woods, Colonel C. G. Edgar, Colonel E. Lester Jones, Colonel A. L. Fuller, Colonel C. H. Shieds.

W. C. Potter, Assistant Director of Aircraft Production

Major-General William S. Kenly, Director of Military Aeronautics

The above mentioned officers and scores of other officers and men in their staffs, make a formidable array of efficient men, and any one in close touch with them knows that they and their organizations are capable of carrying out an aircraft programme ten times as large as the present aircraft programme.

A great many of them know that the only "safe" programme is the programme which permits building all the aircraft and motors that can be built, and as fast as they humanly can be built, and that so long as there are manufacturers working at only part of their capacity, everythings is not being done that should be done. They also know that the public will hold them responsible if we fail to produce sufficient aircraft to maintain absolute mastery in the air next spring—to do which may require tens of thousands of different types of aeroplanes.

Everybody Waiting for Mr. Ryan to Return

Everybody is waiting for Second Assistant Secretary John D. Ryan to return from overseas, and everybody hopes that following his return there will be adopted

(*Continued on page* 323)

DAYTON—AVIATION CENTRE OF THE NATION

By HOWARD EGBERT

STRICTLY speaking, Dayton assumed the aerial leadership of the nation ten years ago.

More specifically it was on one particular afternoon, May the sixth, of the year 1908.

The traditions of aeronautics credit an enterprising young newspaper reporter, safely hidden behind the foliage of a street overlooking the Sand Dunes near Kitty Hawk, North Carolina, with having made the discovery that Dayton had earned the right to leadership. When Orville Wright and his brother Wilbur made their first successful flight in a heavier-than-air machine a decade ago, Dayton suddenly became conspicuous among the cities of America. Until that day the world thought Dayton was capable of making only cash registers. Then a new star appeared in her firmament.

It was almost a week later before folks in Dayton knew their city had become internationally famous. The community at that time had about 85,000 people and a diversified lot of industrial activities. Some people were skeptical about the news. They couldn't quite grasp the fact that two fellows "following around a bicycle repair shop" had enough brains and "get up and get" about themselves to give the world its first heavier-than-air flying machine.

Some folks wouldn't believe the news until Wilbur Wright some time later actually flew over the city. His aged father, a retired United Brethren minister, and his sister, Miss Catherine Wright, had enough faith in the two boys to know that if they said they had invented a heavier-than-air flying machine, they had. The world a little later on acknowledged it. Princes and peasants in a dozen countries of the old world saw the "impossible" accomplished and thus Dayton's place in the sun became assured.

The Air Building, Dayton, headquarters of the Aeroplane Production Department and the Aircraft Experimental Department

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It was Lord Northcliffe who, with prophetic vision, first saw the possibilities of this modern Dayton becoming the "air metropolis of the world." I quote his own words, just as he delivered them one afternoon in October last year, in the midst of an address in Dayton, when he conferred upon Orville Wright, the only remaining brother of the pair which had perfected the first heavier-than-air machine, the Albert Medal, England's magnificent tribute to the genius of the man. It was characteristic of Orville Wright that he thanked Lord Northcliffe for the honor, refused to make a speech and sat down quietly while 5,000 of his fellow townsmen cheered themselves hoarse in acclaiming him its hero and neighbor.

Lord Northcliffe, unlike some prophets, has lived to see his prediction completely fulfilled.

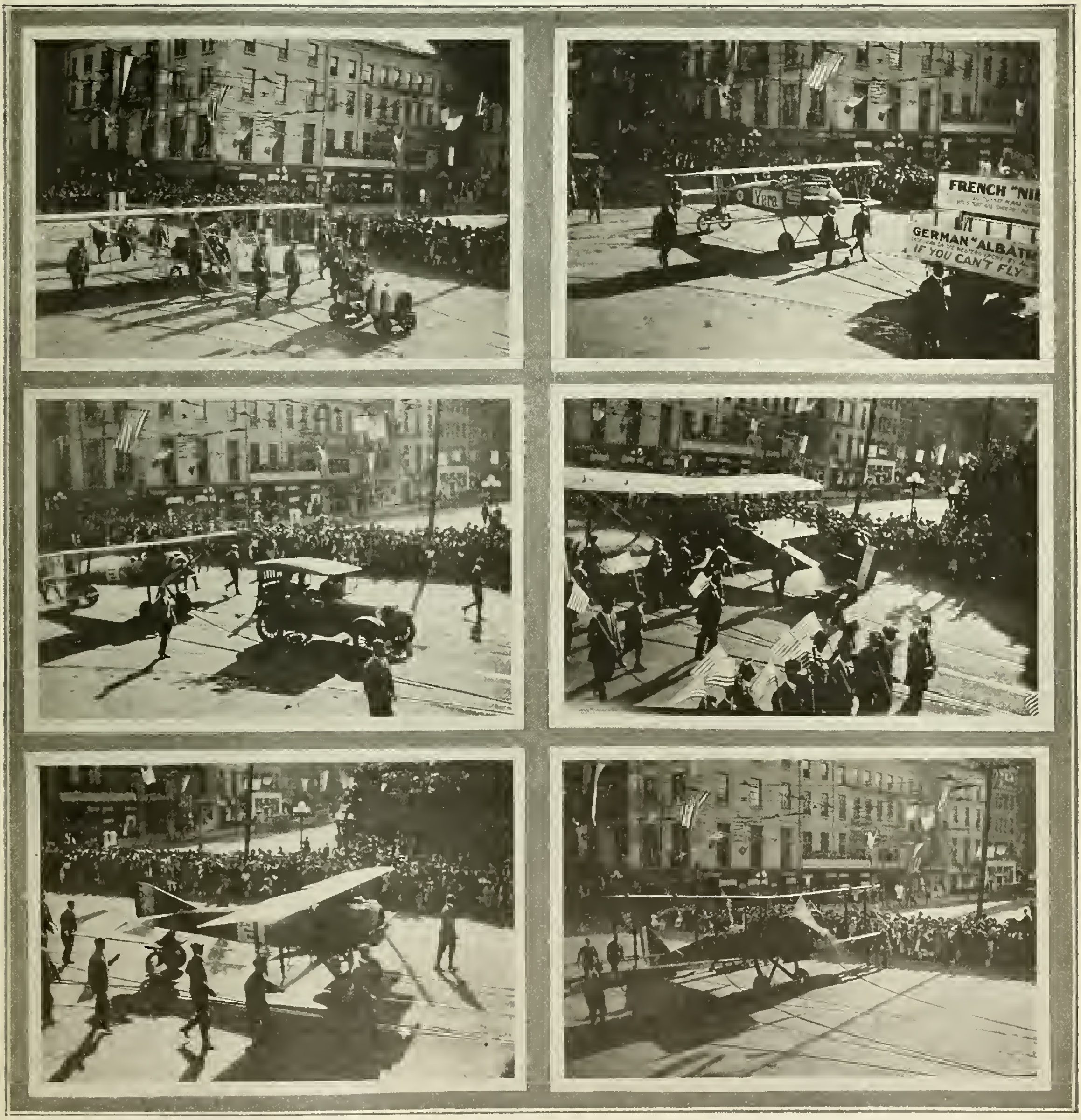
Dayton has assumed a commanding position in international affairs. Over the Western Front Dayton-made aeroplanes, the De Haviland 4's, hurl death and destruction to the Hun. Some of the men who are driving these machines are Dayton-trained pilots and gunners, from the Wilbur Wright Flying Field and Armorer's School, a short distance east of Dayton. The experimental work on these machines has been largely carried on at the M'Cook Experimental Field, within the city limits, while Dayton mechanical brains and genius have assembled the planes and Dayton pilots have been the first to drive them ten thousand feet into the clouds for their maiden-trip into the air.

Dayton is a war city. Witness its growth, if you will. Within the last two years the population has increased from 140,000 to nearly 185 000, a striking evidence of the development. Practically all of this increase is credited to the entrance of war workers of various kinds. One entire factory in the city is giving its entire output of crackers and hard bread to the government; the Dayton-Wright Airplane Company, with its one-story brick and concrete plant, 1,000 feet long, the largest building of like construction in Ohio, employs 6,000 men and women, day and night, turning out aeroplanes, the while operating a secondary plant with 500 workmen at Miamisburg, a few miles southwest of the city.

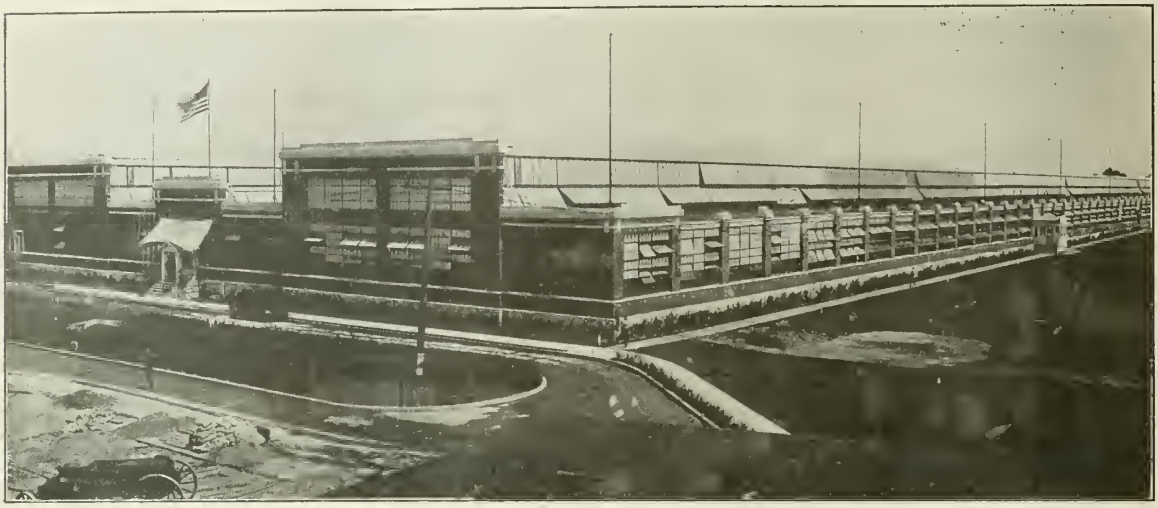
Dayton is a city of 1,000 smokes. Day and night its great engines of industry hum to the tune of Mars. The great National Cash Register Company, where once the world's output in cash registers was made, is given over entirely now to

(*Continued on page 292*)

AERONAUTICS LEAD DAYTON LIBERTY LOAN PARADE



In the recent Liberty Loan Parade in Dayton, the interest in the whole event was dominated by the aeronautical exhibits arranged by the Department of Military Aeronautics and the Dayton Wright Airplane Co. The first Wright biplane was enthusiastically received all along the line, and great interest was evinced in the German machines shown, and in the latest type of American machines



View of the Dayton-Wright Airplane Co.'s factory

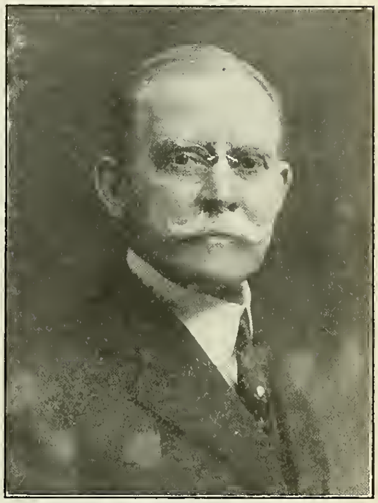
the making of aeroplane parts. Lights from hundreds of plants working by night, speak eloquently of the feverish haste with which the city goes about its task of furnishing the weapons of warfare for the soldiers of the republic "over there".

It is related that Orville Wright not so very long ago, in an interview, declared that the use of the aeroplane for winning wars, was the furthermost thought in his mind and the mind of his brother Wilbur. As a matter of fact the two brothers in the light of current history of their beginnings, did not seem to have any par-

Orville Wright, the pioneer, about to make a flight in a de Haviland with H. M. Rhinehardt

Robert Patterson, vice-president and General Manager of National Cash Register Co.

H. E. Talbott, Jr., president Dayton-Wright Airplane Co.

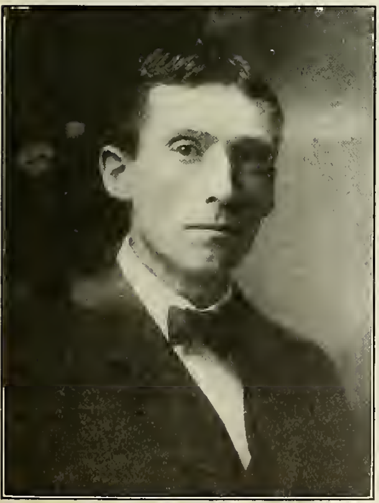


J. H. Patterson, president National Cash Register Co.

George B. McCann, secretary-treasurer Dayton Engineering Laboratories Co.

Harry G. Carnell, vice-president National Cash Register Co.

H. E. Talbott, president Dayton Metal Products Co.



George Egeter, treasurer National Cash Register Co.

Frederick B. Patterson, vice-president and secretary National Cash Register Co.

Thomas P. Gladdis, treasurer Dayton-Wright Airplane Co.

Orville Wright, Miss Katherine Wright and Lord Northcliffe, photographed on the occasion when Lord Northcliffe presented Mr. Wright with the medal of the Royal Arts Society of Great Britain

ticular idea in mind in building the first heavier-than-air machine, other than to develop a scientific principle which, in their own mind, could be speedily and succesfully solved. "The thought of using aeroplanes for bombing defenseless cities and killing women and children never entered our minds ten years ago, when we were perfecting our first machine," Orville Wright said.

But the keen observer of events, William Hohenzollern, Master of Potsdam, saw far into the future that bright afternoon many years ago as he stood before his castle gate in Germany and saw the Wright flying machine gracefully soaring over his estates. His mind became inflamed at once with a desire to use this mechanism to further his own selfish ends.

Orville Wright can tell you better than I can, how "William the Withered" stood appalled at the accomplishments of that Dayton-made machine; how his eyes glistened and his heart throbbed as he pierced the clouds of the future and saw the world at his feet, shackled by the power of monster aircraft that would win for him conquests that even his well-trained armies could not hope to win.

Dayton's reputation as the air metropolis of the world was first established in the Old World, which has always been ripe for scientific achievements and eager to bestow upon its men of learning and development, as well as upon men and women of the young republic of the western hemisphere, tributes of interest and appreciation. While Europe was acclaiming the Wright brothers' accomplishment as the greatest of modern times, practically nothing was heard of it in America and very little in Dayton, because the Wright brothers, following their initial flights abroad and later at home, went into seclusion and set about to perfect the thing they had started.

The world war brought Dayton into the forefront once more.

The first stroke was the building of the Wilbur Wright Flying Field, at Fairfield, five miles east of Dayton. This plant was erected, completed and occupied in less than six months' time and formally opened in July, 1917, with Major A. R. Christie as commandant. From its very beginning it assumed the work of training students in the art of flying and since its opening more than 5,000 fliers have come in and gone out, either overseas or to more advanced courses in other fields in America or France. The field comprises 2,500 acres and was leased by the government from the Miami Conservancy District, an organization which came into existence following the disastrous flood of March, 1913, which swept the Miami Valley in southern Ohio with a property loss of $200,000,000 and claiming more than 400 lives.

The field, despite reports and discussions to the contrary, is located on ground sufficiently high to protect it in time of flood; the engineer's estimate shows the post stands 20 feet above the flood level of 1913, a level newly established for high waters. Draining difficulties early developed and had to be rectified, and improvements were constantly made until in the fall of 1918 the flying school was abolished and in its place an Armorer's School and Testing Field was established. The field is now used for these purposes and is meeting every demand along these lines. Major Thomas Duncan, U.S.A., is commandant at the post.

The Wilbur Wright aviation field very naturally attracted considerable attention to Dayton, being one of the foremost aviation posts in the country and having adjoining it the General Depot of supplies for all aviation fields in the middle west.

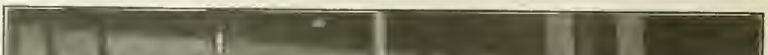
The M'Cook Experimental Field came into existence a number of months later and was located in the northeastern end of the city. It comprised thirty acres and offered a suitable spot for experimental work. Colonel J. C. Vincent, one of the inventors of the Liberty motor, came to Dayton and established his headquarters, superintending all experimental work on the motor and giving his personal attention to a development of this mechanism.

Colonel Vincent has since resided in Dayton and has been foremost among the aviation celebrities who have become a part of the army of workers and leaders in this branch of the service here.

The chief objection to the M'Cook Experimental Field has largely been its size. Many army and aeroplane men have contended the field is not properly located, nor of sufficient size to carry on experimental work of the size required by the government.

The Dayton-Wright Aeroplane Company owns and controls two flying fields at Moraine City, south of Dayton, both capable of handling any demands and requirements made upon them by the continually increasing business at this plant.

The crowning feature of Dayton's triumph was the selection of the city as the national headquarters for the work of the experimental and production service of the aircraft department. For months men closely identified with the work of this department had been housed in several buildings of the city. This, very nat-



Miss Della Dohner, Hand Mill Department of Dayton-Wright Airplane Co., shown operating a mill which cuts slots in aircraft nuts, five in one operation

urally, was not a systematic way of doing a great work and as the result the government finally took over a lease on the newly completed ten-story office building of the Dayton Saving and Trust Company located in the very center of the city. More than 40,000 square feet of office room is available for the departments coming under the direction of the aircraft production and experimental bureaus. The removal of the technical headquarters to Dayton brings more than 500 persons who were previously engaged in Washington and scores of highly trained men in aeronautics have come to Dayton to take up their residence and pursue the duties which have followed in the wake of an ever increasing aeronautical programme for the United States government.

Industrially, Dayton has carried its share of the responsibility for the manufacture of aeroplanes. Three concerns are at present devoting practically their entire plants to making aeroplane parts—the National Cash Register Company with 5,800 employes; the Maxwell Motor Company with 1,100 employes in this particular branch of federal service; and the Dayton Metal Products Company with 4,300 employes. In concrete figures this would mean that eliminating from consideration the 5,500 employes at the Dayton-Wright Airplane Company at Moraine City, nearly 12,000 persons are directly engaged in making aeroplane parts for the government in Dayton. The Dayton Engineering Laboratories Company (familiarly known to the trade as The Delco), is making all the ignition features for the Liberty Motor, which is now so vital a part of the American-made aeroplanes, and thus 3,000 more men and women are directly concerned in the matter of aeroplane equipment, in Dayton.

Figures like the ones quoted above give in a way some comprehensive idea of the man-power and woman-power, too, (because women by the thousands are doing their share in shops and aeroplane plants to win this war by aeroplane).

Much of the work of furnishing the parts for aeroplane construction is turned out by the plant of the Dayton-Wright Airplane Company, located at Miamisburg, where several hundred persons find employment. Since I am writing more particularly about the work for and in behalf of the aeroplane industry in Dayton, I need not attempt to cover the work of hundreds of industrial plants in the city which are contributing with their more than 35,000 workmen to the various kinds of war work in course of preparation; this work would include the making of tanks, lenses for government use, shells for this and allied countries, etc. Dayton is a war city and it has no time for any other consideration until after the war is won.

A view of Wiring Department, Dayton-Wright Airplane Co.

Ten years have passed—momentous years in the history of the world, since Orville and Wilbur Wright first gave to the world their first aeroplane; a crude sort of machine as compared with the great De Haviland 4's which skim the skies over Dayton today. Not so very long ago Orville Wright was taken through the Dayton-Wright Airplane Company plant and given his first ride in the modern bombing machine made there. He soared to dizzy heights under the guidance of a skilled pilot from the aeroplane concern, and when he alighted, it is recorded that he was so amazed at the wonderful progress that had been made with flying machines since that eventful day at Kitty Hawk, N. C., that he found words inadequate to express his surprise.

Dayton has never lost its interest in the aeroplane. The years that have intervened from that eventful day when Wilbur Wright first rode over the city in his newly designed heavier-than-air machine, have failed to dim the interest of the community in the progress and development of aeronautics. Hundreds of men whose names are associated with the air missions of a half-dozen nations, have come to Dayton and stood amazed at the progress the city has made in aeroplane development and the magnitude with which things move along. Scarcely a train pulls into Union Station that does not bring a celebrity to one of the flying fields or the technical headquarters of the aircraft board of the nation. Men come in and go out and the public hears nothing of their visit, so silently and without publicity does the program go forward.

But the greatest point of activity has not yet been reached in Dayton. Contemplated enlargements of many plants and increased demands from the government point the way to an even more tremendous service.

The people in Dayton still think the Wright way to Berlin is the right way to win the war.

Address by C. F. Kettering, Suggestion Contest, April 27, 1918. Employees from all plants assembled at Plant No. 1, Dayton-Wright Airplane Co.

THE PERSONNEL OF THE AIR SERVICE IN DAYTON

BY HOWARD EGBERT

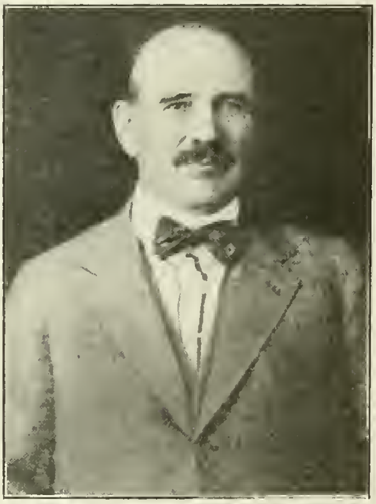
IT becomes a rather difficult thing for the average mind to comprehend the field of activities in aeronautics as it spreads out over Dayton and immediate environs. The swift moving ships in the air, thousands of feet above a hustling, business community, tell us nothing except that man has succeeded in mastering a machine heavier than air and is flying. Orville and Wilbur Wright did that much ten years ago, and the field has increased so immeasurably since that hour of the Wright brothers' triumph at Kitty Hawk, N. C., that there really is no way of comparing the two periods in the development of aeronautics in America.

If you walk past the Air Service Building in Dayton, a towering structure of modern design, you scarcely get the inspiration, because it is on the inside of this building where hundreds are at work, away from the curious eyes of the passers-by that the work is done. Telegraph keys are bearing news and instructions and information from all over America and from the fields of France. Brilliant minds selected from many professions are at desks, figuring, dictating, deciding, experimenting and consulting, the one with the other. The genius of engineering and production match each other in this air building. These two departments dove-tail in their efforts.

Central control, generally conceded to be the business way of handling any enterprise successfully, finds its highest fulfillment in the National Air Service Building in Dayton.

First and chief, then, of the men you would probably meet, were you to start in from Washington for a survey of the situation, would be Newton D. Baker, Secretary of War. Secretary Baker is a busy man. He has his hands full continually, twenty-four hours of the day, directing the affairs of his department. He needs men about him who are skilled in special lines; who can relieve him of some of the responsibilities of his office. Therefore, when it came to handling the aeroplane situation (admittedly as essential an element as can possibly enter into this winning of the war), Newton D. Baker picked John D. Ryan, successful in business, possessing a keen brain for service and production. Mr. Ryan became the Director of the Air Service and Chairman of the Aircraft Board. You would probably meet both Secretary Baker and Director Ryan, who, by the way, is also assistant secretary of war, on the run. While you paused to witness the speed and rapidity with which these men work, because their business requires speed and rapidity, you would run across W. C. Potter. Now Mr. Potter has been aptly designated by the press and he is known in the aeronautical work as John D. Ryan's right hand man. He is Director of Aircraft production. You will have to step some to keep up with W. C. Potter and he instills this same spirit in the minds of those who work for him. Production is his middle name, and it is his office to see that fighting ships for the armies overseas are kept constantly on the move. When production lags Mr. Potter throws on a little more steam and then production increases.

Lieut. Col. J. G. Vincent, Chief of Engineering, Airplane Engineering Division


C. W. Nash, Assistant Director Aircraft Production, in charge of Engineering and Production

The Assistant Director of Aircraft Production, in charge of engineering and production in the Air Service Building at Dayton, is C. W. Nash.

Your visit has brought you to Dayton. If you have thought business was booming before, you are impressed the more with this thought, once you visit the Air Service Building.

Uncle Sam has picked the best, when he made up his air service personel. You are doubly impressed with this thought, once you gain admission to some of the private offices of the men who are doing the work in Dayton.

Three distinct divisions are at work now in the Air Service Building—the Engineering Division, the Production Division, and the Technical Section of the Division of Military Aeronautics. Each in its way co-operates with the other. Lieut. Col. J. C. Vincent, one of the two men credited with having developed the world marvel—the Liberty Motor, is Chief of the Aeroplane Engineering Division. The field of activity of this division extends in a particular way over the McCook Experimental Engineering Field, which is located within the Dayton city limits. Here a huge force is constantly at work. Well equipped laboratories are located here. Aeroplanes of many types and designs go through the "third degree" test here. Major H. E. Blood is chief of the Business and Military section in this division.

At the McCook Experimental Field Major H. C. Marmon is Chief. The Engineering Executive is C. H. Skinner. Captain H. H. Blee is in charge of the technical publications and library department. The field manager is Caleb Bragg, daring air pilot and formerly as well known in the automobile racing game. Bragg's record trip from the McCook Field to Washington, D. C., in two hours and 57 minutes in an aeroplane excited no end of curiosity and interest several weeks ago. The McCook Field organization long since proved its efficiency for service and has elicited favorable comment from the government in Washington.

Colonel T. H. Bane, who is Chief of the Technical Section, Division of Military Aeronautics, occupies with his departments, the two floors of the Air Service Building nearest the top. The Wilbur Wright Test Feld, located at Fairfield, east of Dayton, reports to him. It is his organization that tells the Engineering Division what type of aircraft the army needs. It tests aeroplane devices that experts develop and decides which shall be produced for the army. Once these devices and aircraft types are decided upon, the scene shifts to the Production Division which produces them.

The Master Records and Changes are kept on file at the Air Service Building in Dayton. This has been found a master stroke of business genius and has justified its introduction as a secure and safe administrative measure. As Chief of the Production Engineering work in the Air Service Building a civilian is found, J. F. McClelland, while under his jurisidiction

Major H. E. Blood, Chief of Business and Military Headquarters, Airplane Engineering Division

Major H. C. Marmon, Chief of Experimental Engineering Department, McCook Field, of the Airplane Engineering Division

J. F. McClellan, Chief of Production, Engineering Dept. of Airplane Engineering Division

Col. T. C. Bane, Chief of Technical Section of the Division of Military Aeronautics

is found various and diversely important offices, each having in a particular way to do with the development of the work in this division.

C. W. Nash, Assistant Director of Aircraft Production, in charge of engineering and production, is a busy man. If you don't think he is, try to see him some day at his offices in the Air Service Building. The chances are about 50 to 1 you will find he is in Buffalo, or New York or Washington or in some of the cities where production needs hustling up a bit to keep things moving overseas. Most of his time is consumed in keeping the wheels moving in the way of hastening production.

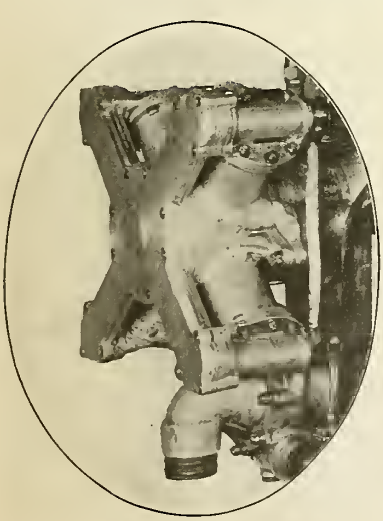
Mr. Nash was well selected for this post. His success as an industrial leader spoke eloquently of his fitness for any work that required skill and business acumen. His biographers always start with C. W. Nash and the Durant-Dort Carriage Co., in Flint, Mich. That was a good many years ago, when carriages were less of a curiosity than they are now. Along about 1909 (dates aren't of any particular value when you are writing about successful men) C. W. Nash became president of the General Motors Co., a combination of industries that proved one of the greatest ever conceived in America. It was while serving as head of the Nash Motor Co. that Mr. Nash was called into federal service. He responded without argument, even though he knew he was yielding a good paying business and a successful one. If the country needed him, his business didn't need him—this was the principle under which he planned to enter actively into government work. He has served with eminent distinction in his work for Uncle Sam. What greater tribute could you pay a man than simply that?

I must not, in passing, neglect to call attention to a thing I hastily mentioned previously—that of central control. The esentiality of this thing has not been overlooked in the organization of the Air Service, and we see it particularly emphasized in the operation of the various departments in Dayton. There is no such thing as discord here. Things have to "hitch" under the expert system employed. No one goes outside his field of activity, but these fields of activity co-operate and co-ordinate in such a masterly way that failure is negatived everywhere.

Men have been selected by the government for its air service with more than ordinary care. The general tendency has been to command the services of experts. The aeronautical division of the army development has already proved its worth. Results count most of all. The tales that come to us from overseas, telling of the briliant exploits of American airmen, send a thrill through the bodies of red-blooded Americans.

Few stop to consider the tedious path that has been trod in developing these air conquering machines that have all but pushed the German pilots out of the skies. The thought comes to us that, out of experiments, conferences, hazardous tests and even from the work-bench of the skilled workmen have come these mechanical birds that shall blaze the way for Yankee infantry and Yankee guns to the very nest of German trickery—Berlin.

THE LIBERTY STARTER



The Liberty Starter

THE Liberty Starter is an air motor and compressor in one. While acting as a starter it runs as a four cylinder air motor, cranking the aeroplane engine through a train of gears inclosed within its transmission.

At the end of the transmission is a final drive that connects direct to the crankshaft of the engine. This drive runs continually at engine speed and operates a small pump which furnishes pressure for the gasolene feed. See cut. After starting the engine the Liberty Starter automatically disengages and remains so until needed for further use either as a starter or compressor.

In order to keep an adequate air supply in the tank the starter is engaged as a compressor by pushing a button on the control valve while the aeroplane engine is running at low speed.

When engaged the engine must be speeded up to 1,200 to 1,400 R.P.M's. At 230 pounds pressure the compressor automatically disengages. There are over nine hundred of these starters in use on planes in this country, and the U. S. Mail Service is installing them wherever possible.

Now the Liberty Starter is ready for Foreign Service. It has been thoroughly tested and in every instance has shown itself the best type of aeroplane. First, it is light, weighing but 30 lbs.; second, it is compact, measuring 8" long; third, it is efficient, cranking the aeroplane engine at 150 R.P.M.'s or more and replenishing its own energy in 30 seconds, less time than any other device known, and finally, it is simple, as there are no pipes leading to the aeroplane engine, this leaves the engine in its natural state. The tank weighs 12¼ lbs., making the complete outfit 49 pounds.

THE ENGINEERING AND BUSINESS GENIUS BACK OF THE CURTISS AEROPLANE AND MOTOR COMPANY

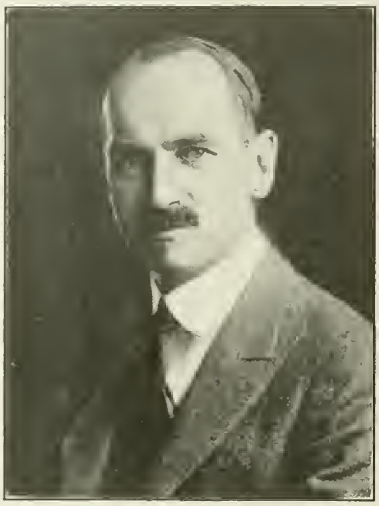
WE are enabled this week to give short biographical sketches of some of the men back of the Curtiss Aeroplane & Motor Company, one of the largest contract holders working with the Bureau of Aircraft Production.

John North Willys

There are two men in the automobile industry whose names and personality are as familiar to the boy and the man on the Atlantic seaboard as they are to the man and boy on the Pacific coast. One of these two men is John North Willys, the president of the Willys-Overland Company of Toledo. For many years, Mr. Willys has been esteemed as one of the most progressive automobile manufacturers. His production methods have set the pace in many respects in that enlargement of our national, social and industrial life the ever-increasing use of the motor car has brought.

Mr. Willys has recently been elected the president of the Curtiss Aeroplane & Motor Corporation as a result of the combination effected between the Curtiss Aeroplane & Motor Corporation as a result of the combination effected between the Curtiss forces and the Willys-Overland interests. The result is no less important to the immediate production of the thousands of aeroplanes now needed, than it is to the assured pre-eminence of this country in the manufacture of the flying machine the United States gave the world. There is represented in the combination a linking of the aeroplane's development in which Glenn H. Curtiss has been the leader, with the command of markets for raw materials and the enormous production facilities Mr. Willys has made possible.

Mr. Willys was born in Canandaigua, N. Y., in 1873. He had his first business experience in the bicycle industry. He conceived the idea then of reaching markets for manufacturers who were unable to reach them on their own initiative. His success as an automobile manufacturer has been based on that idea—the creation of the markets in all corners of the world with the production at home to meet the demands. After leaving Canandaigua, Mr. Willys went to Elmira and there bought the Elmira Arms Company. The automobile was barely out of the experimental stage when he organized the American Motor Car Sales Company, with headquarters in Indianapolis. In the fall of 1907, he assumed the management of the Overland Automobile Company of Indianapolis, and a few months later, in the winter of 1908, he had acquired control and assumed the presidency of the company.



Glenn H. Curtiss, the pioneer, still helping Uncle Sam to "put it over"

That was the start of the tremendous business which now is known as the Willys-Overland interests. Markets were created. The name Overland was made as familiar as the name of the local daily newspaper. In October of that year, Mr. Willys had acquired the Marion Motor Car Company of Indianapolis, and in April, 1909, he purchased the Pope-Toledo plant in Toledo, Ohio. From that time the Overland headquarters have been Toledo. In a very few years Mr. Willys was a national figure in finance and an industrial leader of commanding force, controlling a score of industries. Certainly a series of successes measuring large for a man who is only in his forty-fifth year.

He is fond of all outdoor sports, being particularly interested in automobiling, golfing and yachting. He is a member of the leading social and sporting clubs of Toledo, and for several years has been a member of the Aero Club of America and the Society of Automobile Engineers. Mr. Willys is married and has one daughter.

Henry Manning Root

Mr. Henry Manning Root, Assistant Comptroller of the Curtiss Aeroplane & Motor Corporation, was born in Buffalo and was educated in the Buffalo Public Schools and Colgate University. He did excellent work for the International Harvester Company from 1901 to 1911, and from 1911 to 1916 he conducted a business in public accountancy. He is the First Vice-President of the Buffalo Aircraft Club and has been vitally interested in aeronautics for a number of years.

Charles B. Wilson

Mr. Charles B. Wilson is a Vice-President and the Production Manager of the Curtiss Aeroplane & Motor Corporation. He was born in Warren, Ohio, and practically his entire career has been spent in factory management positions. While with the Diamond Match Company, he designed special machinery of great value, and during his eight years' general superintendency of the Olds Motor Works of Detroit and Lansing, he gained very much valuable experience. Later he became Vice-President of the Ferro Foundry & Machine Company of Cleveland. When he disassociated himself with the Ferro Company, he went to Pontiac and organized the Wilson Foundry and Machine Company. He was sub-

James E. Kepperley, Vice President and General Manager, Curtiss Aeroplane & Motor Corporation

W. W. Moss, Comptroller, Curtiss Aeroplane & Motor Corporation

H. M. Root, Assistant Comptroller, Curtiss Aeroplane & Motor Corporation

Clifton Reeves

sequently invited by Mr. Willys to join the Curtiss Company as Special Production man, and while he is undertaking this work at Buffalo, he still retains his interest in the Wilson Foundry and Machine Company, which is now under the management of his brother, Mr. David Wilson. Mr. Wilson is a big man physically and mentally, and he is making a very definite impression in his new associations in Buffalo.

Fay Leone Faurote

Mr. Fay Leone Faurote was born at Terre Coupe, Indiana, July 26th, 1881. His father is cashier of the Niles City Bank of Niles, Mich. The ancestors of the Faurote family on the paternal side were from the French Huguenots, and on the maternal were English and Scotch. The early members were noted to have fought in all our wars, with the exception of the Mexican. A number of the progenitors were identified with railroads and other early transportation interests. They were early settlers in New York and New Jersey, later moving into the states of Michigan, Ohio, and Indiana.

Mr. Fay Leone Faurote received his education at the Niles, Michigan, high school, from which institution he graduated in 1899. In 1903, he received the Degree of Bachelor of Science in Mehcanical Engineering, at the University of Michigan, and finished his schooling with a business course at the Lansing Business College.

Fay Leone Faurote, Publicity Director of the Curtis Aeroplane & Motor Corporation

His first occupation with the commercial world was in a retail grocery establishment, at which he remained for a period of ten years. He was also an assistant to the city engineer before he took his university course. After Mr. Faurote took his degree, he worked through the shops of the Olds Motor Works as an apprentice, from which he was advanced to draftsman and assistant experimental engineer, and in 1904 he was appointed the advertising manager of the corporation. He held this position until 1908, when he resigned to take the important office of advertising manager of the E. R. Thomas Motor Co. of Buffalo, N. Y., and that position he holds at the present time.

Mr. Faurote has contributed largely to the literature regarding the automobile. He is the author of "Busy Man's Text Book on Automobiles" and "The How and Why of the Automobile," two very valuable works, and considered by "those who know" to be the best and most complete works yet issued on their respective subjects. He is also the author of "A Boy's Text Book on Gas Engines," which has had an enormous sale. Mr. Faurote is a prominent writer of many technical and automobile subjects. Independent of his extensive duties, as mentioned, he found time to be the instructor of the Detroit Motor School while in that city, and is now identified with a School of Advertising in Buffalo.

As advertising manager of the Curtiss Aeroplane & Motor Corporation, and assistant secretary of the Aircraft Manufacturers' Association, Mr. Faurote is doing constructive work for aeronautics.

Charles Matthews Manly

Mr. Charles M. Manly, Chief Inspection Engineer of the Curtiss Aeroplane & Motor Corporation, was born in Staunton, Va., in 1876. He is the son of Charles Manly, D.D., President of Furman University, Greeneville, S. C., from 1881 to 1898. His elder brother is Capt. John M. Manly, Head of the Department of English, Chicago University. His younger brother, Basil M. Manly, is at present Economic Editor of Scripps-McRae newspaper Syndicate, Washington, D. C.; on temporary leave serving with Federal Trade Commission.

Mr. Manly has been Assistant in charge of Smithsonian Institution to Dr. S. P. Langley, in development of aviation from 1898 to 1905. He is Vice-President and Chief Engineer of the Manly Drive Co., of New York City. He was Consulting Engineer, British War Office, in 1915.

He is a member of the Society of Mechanical Engineers, Society of Automotive Engineers, Aero Club of America, Buffalo Engineering Society, Cosmos Club, Washington, D. C.

Mr. Manly is joint author with Dr. S. P. Langley of Volume 27, Smithsonian Contributions to Knowledge, entitled "Memoir on Mechanical Flight."

Mr. Manly has patented some thirty or more mechanical devices in the United States and foreign countries pertaining to power generation and transmission.

Mr. Manly took charge of Dr. Langley's work in aviation at Smithsonian Institution, June, 1898, carrying on the construction of a man-carrying aeroplane which he had undertaken for the Board of Ordnance and Fortification of the War Department and continued in charge of this work until it ceased, from lack of funds, in December, 1903. Continued aviation research work from then until further lack of funds caused complete stoppage of aviation work at Smithsonian Institution in 1905.

Charles M. Manly, Chief Engineer, Curtiss Aeroplane & Motor Corporation

W. W. Moss

William Ward Moss, on February 9th, 1918, was elected a vice-president and comptroller of the Curtiss Aeroplane & Motor Corporation. For two months before his election he had served the government as examiner for the war credits board at Washington, D. C. To his new tasks, highly important in the country's war programme Mr. Moss has brought the genial enthusiasm, the same driving energy and capacity which in a short span of years had won him recognition among the bankers of the south.

Less than thirty years ago, Mr. Moss began his business career. It was shortly after his graduation from the Chester Academy in 1889 that he went to work for the Chester National Bank at Chester, Pa. From that year until 1898, Mr. Moss remained with the Chester Bank, winning promotions regularly in his chosen field. In 1898 he became the cashier of the First National Bank of Media, Pa., and five years later his ability was recognized in his election, 1903, to the presidency of the

(*Continued on page 302*)

Charles B. Wilson, Vice President and Production Manager, Curtiss Aeroplane & Motor Corporation

TEN YEARS OF HALL-SCOTT

By JAMES G. STAFFORD

OF all the startling changes in the job of making war, as we of to-day know it, the most remarkable is undoubtedly the wide use of aircraft in all purposes of attack and defense. Aircraft were scarcely beyond the stage of the aerial acrobat when the war began in August, 1914. To-day they are depended on as the eyes of the army. Upon the accuracy of the observer's reports on high, depend the timing of attack, the control of the artillery, the movement of a million men. It has come to be the most relied upon arm of the raider over the enemy's lines, and the means of disturbing his troop concentrations, industrial centers, and interior producing areas.

An Epochal Four Years

There were few in either America or Europe, when the war began, who conceived the use to which aircraft would be put. Few, who dreamed of its rapid development in the short four years since the first shot was fired at Belgrade. Consequently manufacturing facilities were few, and meagre in the extreme. All were inadequate, as contrasted with those available for the manufacture of other forms of war material. Practice, design, engineering problems were yet unsolved, or only beginning to be understood.

Successful Engine Builders for Ten Years

Aeroplane engines have been built and furnished to successful flyers for aeroplanes for more than ten years by the Hall-Scott Motor Car Company, of San Francisco, California. This concern had been engaged in this business for six years, when Europe was first deluged with its present bath of blood and fire. Hall-Scott powered planes had broken records for endurance, speed, altitude, and generally satisfactory performance and had been used extensively by Allied governments, before the United States entered the war. Our own Army and Navy Departments had tested its engines, and had found them satisfactory.

Began Building in 1908

Thus, when E. J. Hall, now Col. Hall, U. S. Aviation Service, in charge of motor work in two big factories on the fighting front in France, built his first eight cylinder "V" type engine back in 1908 for a man named English, who wanted to use it in a helicopter, it marked the establishment of the first all American aeroplane engine building business. That business has gone forward always a pace ahead of demands, until to-day its originator, chief engineer, and designer is the nation's chief dependency in the perfection of the Liberty engine.

Liberty Engine Embodies Hall-Scott Practice

It was Hall-Scott practice in all essential details, incorporated by Col. Hall in the Government's super aeroplane engine—The Liberty "Twelve"—in an unselfish effort to serve the nation in its emergency. It was Hall-Scott experience, personified in the modest unassuming, hard working Chief Engineer of the Hall-Scott Motor Car Company—Col. E. J. Hall, himself—that piloted the development of that 12 cylinder Liberty engine through its initial designing, and made possible the perfected machine of to-day. It is that same personality, modest, quiet, almost timid, sternly opposing publicity, avoiding the focalized glare of the limelight, that is solving the nation's aeroplane engine building problems in France.

First Overhead Valve Engine Hall Built

Hall-Scott was first incorporated as a company to build railroad motor cars. Previous to the time the company was organized, Bert C. Scott was Secretary of the Yreka Railroad, operating in Northwestern California, and had been engaged in searching the country for a self propelled railroad motor car. He had been unable to obtain one throughout the East. Returning to San Francisco without the necessary equipment he told his trouble to Col. Hall from whom he had purchased one of the latter's famous "Comet" racing cars with a Hall built overhead valve engine, which ran away with everything on the track and road in those early days of automobiling. Together they planned and developed the now familiar motor driven passenger car of the railroads. It proved such a success the two formed a partnership for manufacturing them. That is why the concern is known as the Hall-Scott Motor Car Company.

Busy on Aeroplane Engines

Considerable time elapsed before any orders were received for these motor cars. Meantime, the factory and plant at West Berkeley, California, was kept busy night and day with orders for aeroplane motors. Quite a few of the engines were sold to local aeroplane builders.

Chas. K. Hamilton came to San Francisco, in 1910, and soon became an enthusiastic Hall-Scott engine user. His first Hall-Scott engine was later turned over to John Frisbe, for use in making the Belmont Park-Mineola (New York) flight, which was considered a big feat at that time. These flights, and others by Captain Thos. Baldwin's exhibition flyers helped establish the Hall-Scott engine's reputation, which soon extended across the water, to Europe, and reached the Orient.

Los Angeles Meet Hall-Scott Powered

More than half of the planes which participated in the Second International Aeroplane meet at Los Angeles in 1912 were powered with Hall-Scott engines. The many remarkable feats of that wonderful affair were made possible by the perfection of engine functioning, already attained by the Hall-Scott power plants.

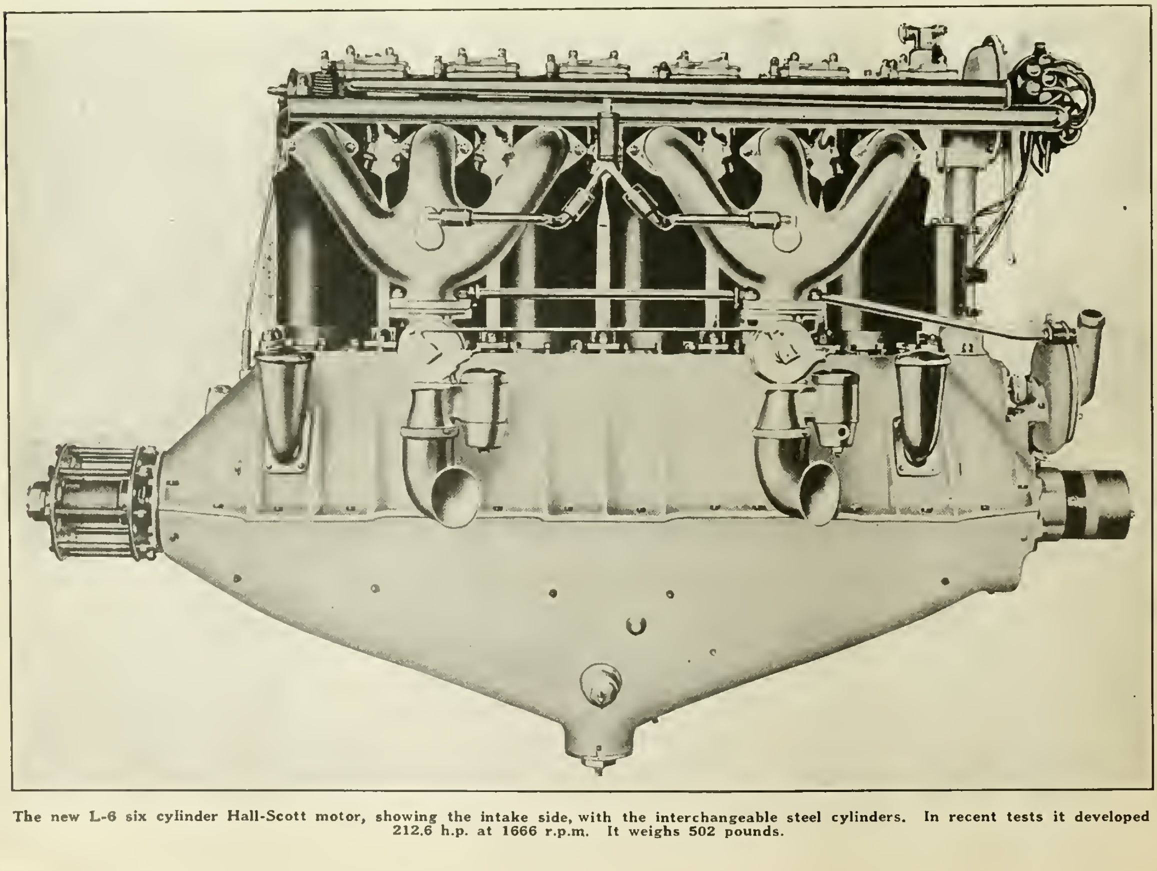
At that time the factory was turning out about fifty aeroplane engines per year—quite a large production as viewed in the light of those days. Continued improvements in the earlier engine types were being made by Col. Hall. The company finally built a larger type engine than any theretofore attempted. It was an eight cylinder, "V" with 5 inch bore, which was used by Glenn L. Martin, in competitive U. S. War Department trials at San Diego, in September, 1912. Notwithstanding some reports to the contrary, Mr. Martin and his Hall-Scott powered plane, was the only one who successfully passed all of the required tests. These trials cost the Martin Company and the Hall-Scott Company about $25,000.

Standardizes on Mercedes Type Engine

Up to that time the Hall-Scott company had expended more than $37,000 on the 8-cylinder "V" type engine, when on the return from San Diego of Col. Hall, it was decided this type engine was not a satisfactory proposition, he advised discarding it entirely, and the building of a verticle six cylinder engine of the Mercedes type.

Russia Orders Three Hundred

Completion of this engine, and tests before the Automobile Club of America in New York City,



The new L-6 six cylinder Hall-Scott motor, showing the intake side, with the interchangeable steel cylinders. In recent tests it developed 212.6 h.p. at 1666 r.p.m. It weighs 502 pounds.

and in actual and thorough flying tests in the Martin planes and in the Sloan plane, designed by C. H. Day, proved it was such a remarkable success, that an order for three hundred was placed with the Hall-Scott Company by the Russian Government. These were manufactured under the most rigid Government inspection at the West Berkeley plant, and completed with deliveries in full thirty days ahead of the contract date. This was the first actual war order received by the company. It was really the only concern in the United States in a position, with the perfected engine, the engineering organization, and the completely equipped factory, to accept such an order, and carry it through on schedule.

Large Sums Into Experiments

Improvements in this original six cylinder type engine, increasing its horsepower rating from 130 to 160, adding improvements and refinements, through the reduction in weight per horsepower, etc., called for additional expenditures of large sums in experimental work. The company also built a 4 cylinder equipment, which was adopted and proved satisfactory for primary and advanced training plane work.

Expanding Factory Facilities

The plant at West Berkeley, where Col. Hall and B. C. Scott began manufacture of aeroplane engines, as a partnership, in March, 1910, soon expanded with the demands for the Hall-Scott engines. The company was incorporated on Feb. 8, 1914, with a capital stock of $100,000. It was and remains a close corporation, with E. J. Hall, B. C. Scott, and L. S. Scott as the sole stockholders. It started with a paid up capital of $23,000. Its first dividend was paid last year, all previous earnings having gone into experimental work, equipment, and improvements. The plant at West Berkeley, California, is now actually worth, with stock on hand, $1,000,000.

Out With New Six-Cylinder Engine

To-day Hall-Scott has brought out a new six cylinder aeroplane engine that marks another big step in design, and also in Hall-Scott progress. It is distinctly in line with the best thought of the day as regards aeroplane power plants. Announcement of its new "L-6" type, six-cylinder 200 horse power engine was made early this year by the Hall-Scott Motor Car Company. Government tests were completed this summer, and those, together with comparison with tests records of their earlier types of six-cylinder engines of the A-5 and A-5a Models, point to the fact that the new L-6 type is almost the ideal for either single or twin motored planes.

Col. E. J. Hall, of the Hall-Scott Motor Co.

Accepted for Navy Department

The L-6 engine tested by George R. Ross, government inspector at the West Berkeley, California, plant of the company, developed 212.6 H.P. at 1666 R.P.M., and weighed 502 pounds. This is equivalent to 2.36 pounds per B.H.P. Inspector Ross passed the tests as satisfactory, and purchased the engine for the Navy Department, for which he was acting. Notable points of comparison, marking the advance of the L-6 type, contrasted with the A-5 and A-5a, which developed at best only 160 H.P. is found in the weight. In the L-6, it is 2.36 pounds while with the A-5a, which developed at best only 160 H.P. it is 3.75 pounds. Much of this reduction in weight is of course possible through the substitution of steel cylinders.

Uses Steel Cylinders

Due to the increased strength of the steel cylinders, interchangeable, throughout the entire series of Hall-Scott engines, it is possible to have higher compression pressure, and higher thermal temperatures. Considering the greater volumetric efficienty of this engine, the fuel consumption of .55 pounds per h.p. hour, is no greater than in the older type engines.

Ideal Engine for Twin Power Plants

Planes powered with this L-6 engine in duplicate, or even as a three engined flyer, seem to offer the solution of the easily operated, controlled, and efficient flying craft. With either engine alone there is power enough to maintain a remarkable speed, and with the perfection in design of aeroplanes, such as attained already in such flyers as the Loughead flying boat, which is powered with two A-5 Hall-Scott aeroplane engines, little difficulty in control is experienced in case of one only being used. With two such engines in operation such a heavy plane as the Loughead flying boat is capable of considerably more than 100 miles per hour.

Most Logical for Reserve Power

The twin engined plane is far more dependable as a bomber, or as a mail carrying plane than any single engined plane of whatever type. There is always a power reserve for extra speed, when necessary. In the case of disablement of one engine while in the air, the plane can continue flying until either its mission is accomplished, its mail delivered, or a suitable landing place reached, where repair work can be done. With two power plants of ample size, such as furnished by the L-6, 220 H.P. Hall-Scott aeroplane engine, an almost indefinite life for the engines is assured, because neither would be flown with wide open throttle, as is the case with many of the single engined planes. These in order to maintain speed, and climbing ability, must be run at wracking engine speed. It is said this use of only two-thirds or three-quarters of the engine throttle, and consequently engine power, is the secret of the long life of the German aeroplane engines, as contrasted with the remarkably short lived Allied Engines.

AIR DIVISION DISCOVERS WEALTH OF SURPLUS AND UNUSED MATERIALS

The war Department authorizes the following:

The Division of Military Aeronautics has turned up since August 6 a surplus of supplies worth $10,000,000 and its examiners have not yet finished their task. These supplies already listed include typewriters, motor cars, motor trucks, oil, lumber, wood, iron, and steel working machines, motorcycles, building material, aeroplanes, and about everything in the accessory line from screw eyes to stove bolts.

The official name of this system, which has begun to conserve supplies, is the Surplus Inactive Supplies Service, Purchase and Storage Branch, Purchase, Storage and Traffic Division of the General Staff. It has branches in most all bureaus of the War Department, the object being to utilize duplicate supplies purchased through the unavoidable lack of organization in the emergency and rush at the beginning of the war. These surplus supplies, as fast as they are found, are listed and through a system of trade, transfer and sale either put to use in the department or sold in the public market.

Within its own division, since August 15, Military Aeronautics has sent out lists of 1,200 different surplus items, including more than 50,000 separate units, amounting in value to over $3,000,000. Each of the seventy-five branches in this division was asked what articles, if any, it wanted, and so far 532 orders for over 30,000 separate units at a value of $750,000 has been returned calling for some of this surplus material. The work of transferring this material from those who do not want it to those sub-divisions who do is now under way, and this readjustment will continue until the total supply of all branches is reduced to stock on hand sufficient for three months in advance.

Already the Division of Military Aeronautics has turned over to the Surplus Inactive Supplies Service of the General Staff property amounting to $2,087,341.35 which none of its own branches could use. Some of the larger items on this list were 150,000 gallons of oil worth $75,000; 417 typewriters valued at $25,000; 200 tons of hay valued at $3,000.

Another and different class of surplus supplies now being inventoried for turning over to the Surplus Inactive Supplies Service of the General Staff includes parts for 3,500 French Gnome aeroplane motors listed at the time they were ordered in this country by the French High Commission, $10,500,000, but which now must be sold as junk for from $25.00 to $120,000 a ton. There are 2,000 tons of these motor parts. This motor was at one time one of the most popular motors in France, but now, owing to the rapid advance in design and construction, the type is becoming obsolete. Very few of these motor parts are finished. Some are yet in steel billets; some are finished as high as 90%; some as low as 5%; some have been boxed and sent across seas. All will now have to be scrapped. Eventually they will be paid for by the French Government, the money to buy them having been advanced by the United States.

With these Gnome motors will go 300 Penguin training planes worth $750,000, a type that is now obsolete, and 128 L.W.F. aeroplanes worth approximately $1,427,000. In this collection will also appear 1,500 J.N.1 aeroplanes valued at $9,000,000 but now obsolete, and 500 additional motors valued at $750,000. It is hoped, however, to utilize these 2,000 motors as engines in submarine chasers and coast patrol boats. The 1,500 planes may also be utilized if a suitable engine is ever developed for them.

Among other surplus material found by the Division of Military Aeronautics and immediately put to use was 4,500,000 feet of ⅜ inch rope. The present demand for rope is exceedingly great and specifications were changed in order to take advantage of this "find." Three-eighths inch rope was substituted for ½ inch rope required and the 4,500,000 feet put into equipment for squadrons overseas, effecting a saving in this instance alone of $75,000.

Another consignment of goods located and immediately put to use was 500 pairs of field glasses worth $37,500. This was found in a supply depot at Omaha. Other emergency supplies to the value of $75,000 were discovered in this same station and immediately shipped overseas.

At the Middletown, Pennsylvania, depot, 9,000 gallons of "dope," a preparation for wing fabric in aeroplane construction and worth $47,500, was discovered and immediately put into use.

Other surplus supplies located included seven carloads of iron, steel, and wood working machinery found in a supply depot at Hampton, Virginia. In one of these cars was a wire testing machine badly wanted in France. Incidentally, 5,000 steel drums wanted for oil containers were discovered in private storage. While they were not the property of the Government, nevertheless they were put into immediate use and the owner paid for them afterwards.

Another saving made by these conservation officers was due to the fact that electric batteries deteriorate rapidly when packed in bulk, becoming practically worthless for issue after two months' storage. In the past it has apparently been the custom to purchase these batteries in great quantities. The price paid was 40 cents apiece. Conservation officers on August 27 found at the New York Supply Depot 150,000 of these batteries and it was estimated 75,000 of them, costing about $30,000, would be practically worthless when the time came to use them. Manufacturers have now been instructed to ship these batteries in bulk directly overseas only upon emergency order, which will insure quick transportation and quick use, and will, it is believed, eliminate about 90% of the battery losses and trouble.

(*Continued from page* 299)

Virginia-Carolina Trust Company of Norfolk, Va. The next year Mr. Moss became the president of the Citizens Bank of Norfolk. Four years later, in 1908, Mr. Moss left the Citizens Bank to become the senior partner in the firm of Moss & Moss, Bankers, of Norfolk, Va., and for nearly ten years he worked assiduously, increasing the success and the prestige of that banking house.

In December, 1917, Mr. Moss left his home in Norfolk to give the government the benefit of his banking experience and in Washington he was an examiner for the war credits board. He was acting in that capacity when he became an executive officer of the Curtiss Aeroplane & Motor Corporation.

Mr. Moss is a veteran of the Spanish-American War. During the years he lived in Pennsylvania, he had served five years in the national guard of that State. When war with Spain broke out Mr. Moss gave up his business interests to serve as a first lieutenant of the Sixth Pennsylvania Volunteer Infantry.

Two of his sons are now with the colors. Robinson M. Moss is a student aviator in the United States naval forces. James A. Moss is in active service in France with the mosquito fleet of the United States Navy. Mr. Moss has six children. One daughter is married, Mrs. S. T. Northern, and her home is in Baltimore, Md. And there are two grandchildren who are the special pride of the family.

Mr. Moss was born in Chester, Pa., October 26, 1869. There his mother lives now. He attended the public country schools and prepared for the Chester Academy at Oak Grove school in North Chester, Pa. He is a member of the Penn Club of Chester, Pa., the Virginia Club, of Norfolk, Va., and the Norfolk Country Club.

Clifton Reeves

Clifton Reeves was born in Tuckahoe, Cape May County, New Jersey, September 8th, 1876. He attended the public school of Tuckahoe and took a special course at the School of Commerce of the Wharton School of the University of Pennsylvania, in 1911 and 1912. At the age of 14 he built a stationary engine that attracted the attention of the officials of the Reading Railway, which afterwards led to his becoming an apprentice in the Baldwin Locomotive Works. From there he was made one of the Master Mechanics of the Reading System.

Subsequently he invented, patented, and built the so-called Reeves Engine that has proven its mechanical superiority in many of the largest industrial and public service plants in New York, New Jersey, Pennsylvania, Delaware, Maryland, and District of Columbia, as well as in many cities in the West, and it is also in service at Princeton University, Cornell, and elsewhere. It was selected by the Pennsylvania Railroad, in competition with all the other engines in the United States, for work in the East River tunnels, and was used there exclusively. It is in use also in a number of government vessels for lighting and similar purposes, and is in service in the District of Columbia Filtration Plant and in the Torresdale Filtration Plant of Philadelphia, the latter the largest institution of its kind in the world. Mr. Reeves, individually, designed these engines. He is the President and General Manager of the Reeves-Cubberley Engine Company of Trenton, and the President of the Reeves Foundry Company, of Trenton.

He organized the Manufacturers and Employers' Association of Trenton, which was afterwards merged with the reorganized Chamber of Commerce; was a Director of the Trenton, Lawrenceville & Princeton Railway during the course of its construction and until the time of its taking over by the Johnson interest; Secretary of the Trenton Association of Machinists and it was in recognition of his fairness in the settlement of a machinist strike in Trenton, in which his company was involved, that he was selected by Secretary Wilson as a member of the Board of Conciliation, of the Department of Labor. His work there speaks for itself, but special mention should be made of his connection with the threatened strike of the traffic clerks on the New Haven Railroad and his activities in connection with the settlement of the Westinghouse strike in Pittsburgh, involving some 86,000 men. The approval of Mr. Reeves' appointment to the Conciliation Board was evidenced in the widespread publicity it received throughout the country, particularly in the technical journals and more important trade papers.

He was appointed, in 1914, by Governor Fielder, of New Jersey, as a member of the Board of Trustees of the School of Industrial Arts, in Trenton, succeeding the late Judge Garrett D. W. Vroom, for which institution he wrote sometime ago an article on the value of industrial training that was widely copied and commented on throughout the country. He is a member of the American Society of Mechanical Engineers; of the National Civics Association; of the Masonic Fraternity (32nd degree); the Engineers Club; the Rotary Club and a Trustee and Deacon in the Central Baptist Church, in Trenton.

He married Miss Elizabeth Hunt, of New Hope, Pa., and has one son, Norman Reeves.

THE ST. LOUIS AIRCRAFT CORPORATION

Mr. A. J. Siegel is the President of the Huttig Sash & Door Company of St. Louis and also the President of the St. Louis Aircraft Corporation of this city.

The St. Louis Aircraft Corporation has a contract with the United States Government for the manufacture of aeroplanes, and the Huttig Sash & Door Company are making all of the wood parts and doing the minor assembling, while the St. Louis Car Company, also of St. Louis, are doing the assembling of the fuselages.

The Huttig Sash & Door Company is one of the largest woodworking plants in America. It has a floor space of very nearly 500,000 square feet and the plant covers a ground area of seven acres. The company was organized in 1885, and ever since has been engaged exclusively in the production of the most perfect millwork possible to manufacture. Consequently the plant was especially well adapted to the manufacture of aeroplanes in a prompt and accurate manner, and the work of making aeroplanes has been carried through by the St. Louis Aircraft Corportation, the Huttig Sash & Door Company and the St. Louis Car Company in a most efficient way.

A. J. Siegel, President Huttig Sash & Door Co. and St. Louis Aircraft Corporation

In the manufacture of aeroplanes there was one big item that had to be considered, and that was obtaining men who were familiar with the production of the article. The organization of the Huttig Sash & Door Company was highly efficient, and in consequence the production of aeroplanes was not delayed but went right ahead from the very start and has kept up to a very satisfactory figure. In the plant they are employing women on various parts of the work of making aeroplanes. They have proven efficient in that they are very painstaking, very earnest and take especial pride in turning out nice work.

Mr. A. J. Siegel is a director in the Third National Bank of St. Louis and Vice-President of the Manchester Bank of St. Louis. He has given a great part of his time, thought and energy to war activities, such as the Red Cross, Y. M. C. A., Knights of Columbus, and the sale of Liberty Bonds. Mr. Siegel is also chairman of the St. Louis district of the War Service Committee, Millwork Industry.

AEROMARINE DEVELOPMENT A MONUMENT TO INGLIS M. UPPERCU

THE Aeromarine Plane and Motor Company of Keyport, New Jersey, a division of the Detroit Cadillac Motor Car Company of New York, is one of the pioneers of aircraft manufacture. It is one of the few companies equipped for quantity production at the time this country entered the war. Specializing in seaplanes, this company has made an enviable record in the manufacture of single and double pontoon hydroaeroplanes and flying boats.

Inglis M. Uppercu, President of the Aeromarine Plane and Motor Company

The officers of the company and the workmen in the Aeromarine plant are justly proud of the fact that more machines have been turned out there per man-power than in any other aircraft factory; that Aeromarine machines are in continuous service, and that not a single life has been lost through faulty construction.

It was in 1908, the year the Wrights astounded the world by their flights at Fort Myer, that the seed of the Aeromarine company was sown with the formation of the Poland Aeroplane Company of Newark. Inglis M. Uppercu, president of the Aeromarine Plane and Motor Company, financed the Boland concern, and it was Mr. Uppercu who furnished the money, the courage and the enthusiasm during all those lean years that followed, in which the government offered no encouragement to aircraft manufacturers. During this time the laboratory work was continued, along with plant enlargements which enabled the Aeromarine company to place at the disposal of the government a large and efficient plant equipped for quantity production at the time such plants were needed most and sadly lacking in number.

In ten years the enterprise in its evolution has expanded from a wee laboratory to one of the best appointed and equipped plants of its kind in the country. Every device for testing strength of material, testing the strength, power and durability of motors are installed. The motor testing room is acknowledged one of the best in the world.

The plant is ideally situated on Raritan Bay with a water frontage of 3,200 feet and a splendid flying field. It is ten miels from Sandy Hook and eighteen miles by water from New York City. To the Naval Training Station at Bay Shore it is fifty-two miles, and forty miles to the Mineola flying field, which has enabled the aerial delivery of training machines to these stations of machines built at the Aeromarine factory, a potent factor in the speed-up program of this country's war work.

From the time of its inception the company has built its machines in their entirety, including engines and propellers, though in filling war contracts the machines have, of course, been from government specifications. But despite the press of war orders the laboratory work has never been allowed to lag, with the result that the Aeromarine company has produced two engines, known as the "B" type and "L" type, that compare favorably with the best motors of foreign and American manufacture.

The Aeromarine company was eliminated from participating in the manufacture of land machines early in the war as a direct result of the superiority of the Aeromarine pontoons and the general efficiency of the Aeromarine type hydro-aeroplanes. The Navy Department placed orders that precluded any attempt to manufacture the M I army machines, which had successfully passed the government tests.

Like all aircraft manufacturers, the Aeromarine company was retarded through changes in specifications during the earlier days of the war, but for more than a year there has been a steady delivery of machines to the Navy Department. It may be said that the Aeromarine company was more fortunate in respect to changes in contracts and specifications than the majority of the manufacturers.

The weight of the Aeromarine hydro-aeroplanes in relation to lifting power of motors with which they were equipped offered a distinct advantage for training purposes which won distinction in the Navy Department. These machines were not subject to weather conditions, leaving the water under any and all conditions, which made continuous training possible at the naval training schools, a factor of vast importance in the curriculum of naval training.

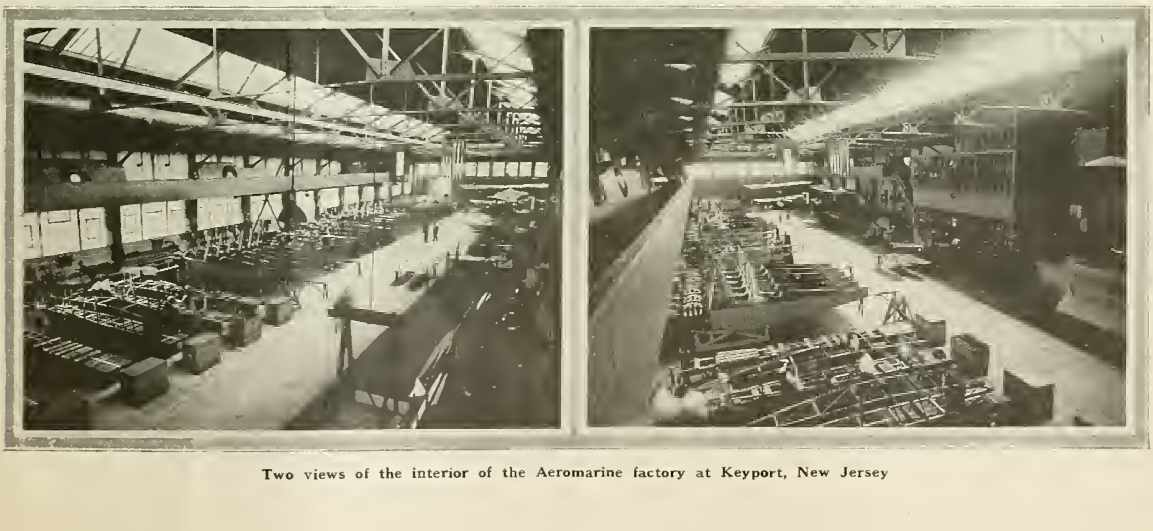
The history of the company is one of tragedy, romance and perseverance of a nature that rarely enters into the prosaic life of mechanical industry. The first product, a tail-less, rudderless machine without wing warps, was flown successfully in the fall of 1908. This model, designed by Frank Boland and built by Mr. Uppercu and Joseph Boland, was controlled by jibs and elevator. Two years later, in a model embracing the same principles, Frank Boland lost his life in a flight at Trinidad, following a series of successful demonstrations in various countries of Central and South America.

Following the death of Frank Boland years of laboratory work followed in which land and seaplane development progressed. This period was marked by costly experimenting with various types of machines and engines.

Charles F. Willard, Chief Engineer

Before the Aeromarine company received its initial order from the government Mr. Uppercu decided to change the location of the plant to a site where unlimited expansion would be possible, and the Keyport location was selected. At no time since the first building at Keyport was completed has there not been more structures under way, but with the best effort to keep pace with the demands of production it has been necessary to purchase or rent buildings elsewhere.

Mr. Uppercu was one of the few who saw a future for aircraft manufacture in this country and he is one of the most enthusiastic regarding the future of the industry for a product designed for commercial and pleasure purposes. It is that faith that actuated him in continuing laboratory work in all departures of land and sea machines, in constructing permanent buildings and the purchase of land sufficient to meet all needs of the future.



Two views of the interior of the Aeromarine factory at Keyport, New Jersey

CHARLES HEALEY DAY,
CHIEF ENGINEER AND DESIGNER.

HARRY BOWERS MINGLE,
PRESIDENT.

DANIEL L. MEENAN, JR
TREASURER.

THE STANDARD AIRCRAFT CORPORATION—BUILDERS OF BOMBERS

FROM the Standard Aircraft Corporation's factory at Elizabeth, New Jersey, have come during the past few months the first examples of American constructed bombing machines. On July 4 was launched the first Amercian-built Caproni, a biplane, equipped with three Liberty motors. On July 6 was launched the first American-built Handley Page, also a biplane, equipped with two Liberty motors. Both machines were built by the Standard Aircraft Corporation. In both cases the tests were successful and we can anticipate that in the near future bombing machines of these types will be turned out in large numbers, and that America will truly begin to be a substantial help to the Allies, aeronautically, just as we have been of great assistance to the Allies in connection with land operations.

The Launching of the Caproni

The final test flight of the Caproni biplane and the handing of the machine over to the Government took place at the Government Aviation Field at Mineola, Long Island, on the morning of July 4th. There was no formality about it. The plane had had its engines installed at the aviation field and when this had been completed and the engines tuned up, Lieutenant Gino, who met his death only a few days later, stepped into the plane and took her into the air for its final test. The machine had been tested several times previously. The performance of the plane is said to have been entirely satisfactory both to the builders, the representatives of the Italian firm, and to the representatives of the Government. The figures as to height and speed are not available at the present time.

Major Tappi, head of the Italian aviation mission to this country, and Major Falchi, of the Italian air forces, represented their country at the experimental flight. Mr. John D. Ryan Director of Aircraft Production, and General William L. Kenly, Director of Military Aeronautics, and Colonel H. H. Arnold, W. C. Potter of the Aircraft Board, Captain Harvey of the administrative staff of the Mineola aviation field, and Majors Rhinehart and Canady were present at the launching. Captain Hugo d'Annunzio and Lieutenant Belloni represented the Caproni company. Commander Briggs represented the Britsh Government.

Alan R. Hawley, president of the Aero Club of America, said:

"The success of the first American built battleplane is one of the most important steps forward in the building of our air fleet."

In connection with the flight, a cablegram was made public, which was recently received by the Italian mission from Captain Fiorello La Guardia, Congresman from New York, who joined the American aviation forces and is now in Italy. Captain La Guardia appeals for the dispatch to Italy of raw materials for the building of aircraft. After expressing his good wishes for the success of the Italian mission he says:

"Please urge the American Government to send to Italy raw materials with which to build aeroplanes. The new type of Caproni war 'plane is a powerful machine, and its success has been proved in the flight from Turin to Rome, in which I participated. Give us raw materials and we will build thousands of aeroplanes here, and our American boys can whip the enemy off the map."

The Launching of the Handley Page

The giant Handley-Page, with a wing spread of 100 feet and driven by twin Liberty motors of 400 horsepower each, took the air at 4:30.

Without its cargo of bombs, the machine weighs 9,000 pounds, or four and one-half tons, and to drive it requires fuel consumption of approximately sixty gallons an hour. The Liberty motors are in an armored compartment on either side of the fuselage. In addition to its bombs, the machine also mounts two light Browning machine guns, which can be fired from any desired angle.

Benjamin L. Williams, of the Standard Aircraft Corporation

The pilot was Lord William Semphill, of the British service, and the man who sat in the machine gunner's seat forward was Major General William L. Kenly, U. S. A., Chief of the Department of Military Aeronautics in Washington. The others in the aeroplane were Captain E. T. Waller, of the Canadian Army; Captain E. L. Austin, of the Royal Flying Corps; Young B. Dawkins, an official of the Standard Aircraft Corporation, and an official moving-picture photographer.

Christened "The Langley"

The aeroplane was christened in honor of Longley by Mrs. Harry Bowers Mingle, wife of the President of the Standard Aircraft Corporation.

After leaving the ground at 4:30 the plane made three wide circles, climbing higher each time. It landed at 4:52. Colonel Semphill said it reached a height of 3,500 feet and maintained an average speed of ninety miles an hour.

The "launching" and test were preceded by a luncheon at the plant, to which several hundred guests were invited. Secretaries Daniels and Baker were invited, but were unable to attend. Benedict Crowell, First Assitant Secretary of War, represented the War Department. Senator J. J. Frelinghuysen of New Jersey and Senator Charles S. Thomas of Colorado also were present.

Columbia Aviator Cited for Bravery

Paris.—Columbia University's Paris bureau on October 4 got news of an exploit by Lieutenant C. L. Nelson of the class of 1016, who distinguished himself in the St. Mihiel offensive. Between the 12th and the 14th of September he brought down a sausage balloon, which fell in flames in a wood inside the German lines. The wood shortly afterward was captured by Americans and the destruction of the balloon authenticated.

Another day Lieutenant Nelson went out with his French escadrille of eight planes. They were attacked by sixteen planes of the "tango circus," formerly led by Baron von Richthofen. Every man of the enemy squadron was an ace.

Our escadrille lost one plane, while the enemy lost three, of which Nelson hagged one. When the fight was over his observer was shot through the leg. Nelson himself escaped with a whole skin, but with a bullet hole through the back of his boot and twenty-one bullet-holes in his machine: Despite this he descended safely within our lines. The fight lasted fifteen minutes, or "about as long," said Nelson, "as one cares to spend in a single scrap with boches."

As a reward for this achievement the whole escadrille was cited and got the Fourragère. Lieutenant Nelson was individually cited for the Croix de Guerre, and hoth he and his observer were recommended for the Cross of the Legion of Honor.

DEVELOPMENT OF THE WRIGHT-MARTIN COMPANY

THE Wright-Martin Aircraft Corporation, who have been manufacturing Hispano-Suisa motors for the French and British Governments for some time, have recently been forced to enlarge their working space to a great extent. They have been allotted a very important part in the aerial programme of all the Allied armies. At the present time they are standing behind very materially larger orders than was the case a year ago. At that time they were working well up to capacity. The company is making every effort to live up to and exceed the programme of deliveries to which they have committed themselves, at the request of the Government. So well were they carrying out their schedule that they were only three days behind in their deliveries up till July. The congestion of freight movements and the movements of troops and such things of paramount urgency played havoc with the company's well-arranged plans so that they are now about thirty days behind their schedule. After the receipt of General Pershing's cable asking for motors at once, the Wright-Martin company have committed themselves to the task of not only keeping up production, but to repair the damage to the schedule, so that before the expiring of the present contracts the final motor will be delivered on the original date set.

The Wright-Martin company now have a factory in Long Island City which will ultimately employ 10,000 to 15,000 men. In their plant at New Brunswick, N. J., at the present time there are employed over six thousand men. Wright-Martin have added the name of the Franklin Motor Car plant to the already long list of plants making parts for the Hispano-Suiza. The Pierce-Arrow Company are also in the Hispano-Suiza field, under the guidance of Mr. Geo. H. Houston, who is the backbone of the Hispano-Suiza programme in the United States.

The Hispano-Suiza motor added to its many laurels a few days ago when a plane equipped with a 300-h.p. Hispano-Suiza motor broke the hitherto existing world's record for altitude. In discussing the motor, one of the officials of the Wright-Martin Company said: "The ideal plane for the Hispano-Suiza motor has not been designed yet. The motor is the "Roamer" of the aeroplane field. It is built primarily for speed and lightness, and for that reason a great many of the Allied 'Aces' prefer the Hispano-Suiza in their bullet-like scouts; for that reason every French Ace uses a Hispano-Suiza motor in his Spads." As a truck horse is lost when it is put upon a rack track, so is a race horse all but useless when it is asked to move a heavy truck. So it is with the Hispano-Suiza motor. Why should a Hispano-Suiza, which will drive a plane at 145 miles per hour on the level be wasted on a heavy bombing plane when it would be of so much more use in a light, fast, fighting scout?"

THE HASLER REVOLUTION CIRCUMFERENCE AND CUTTING SPEEDS INDICATOR

A NEW revolution circumference and cutting speed indicator is being placed on the American market now by Harrah & Co., 42 Cliff Street, New York, as agents for the Hasler Co., of Bern, Switzerland.

The novelty of the instrument consists in its mechanism, the instrument operating without winding or by means of magnetism. Clockwork in the interior of the instrument automatically sets the indicating mechanism when the instrument is started and releases the same after three seconds. During this period the indicating mechanism is in direct communication with the driving shaft of the instrument, thus providing an exact record in a shorter unit of time than it would be possible with tachometers based on the centrifugal or magnetic principle.

The instrument is anti-magnetic, which permits its use freely in electric power stations.

The driving shaft can be rotated in either direction, the instrument registering any number of revolutions up to 10,000 with equal accuracy. On account of its mechanical construction the instrument is independent of the variable stresses of the springs or friction of the bearings, and can be pressed firmly on the moving body without affecting the time element.

It is not affected by vibration or temperatures, and the pointers remain at the figures arrived at until reset.

The instrument has a black circle of figures for reading revolutions, and a red circle for reading cutting speeds and yards per minute.

TITANINE DEVELOPMENT

Mr. E. G. Davis, American Manager of Titanine, Inc.

Titanine, Inc., is an American corporation, organized to manufacture Titanine formulas in America under license of the Titanine, Ltd. The latter is one of the largest manufacturers of dope in England, and has supplied about twenty per cent. of the dope used by the Allies during the war. To this company the aeronautic industry is indebted as Titanine was the first to manufacture a non-poisonous and non-inflammable dope. It is the invention of T. W. H. Ward, S. E. Groves, and Dr. J. G. Ward.

The American corporation has a large, well-equipped plant at Union, New Jersey, which is under the management of E. G. Davis, who recently came from the Titanine, Ltd., of England, to take care of the production in this country. Mr. Davis has made great strides in getting his American plant into production, and announced last week that he is now ready to furnish, in addition to Titanine dope and Planoline fireproofing solution, clear wing varnish and identification paints for insignia in red, white, blue, black, admiralty gray; khaki varnish and dope resistant paint. Four grades of dope are ready to be supplied, one of which is made from material not conserved by the government.

Mr. T. W. H. Ward, the inventor of Titanine

WOODWORKING MACHINES FOR AEROPLANE PARTS

THE manufacture of aeroplanes in this country created a demand for a number of special machines to make the necessary woodwork. While some of the aeroplane structure could be made on the standard machines, there are parts of such peculiar shape and design that it necessitated the making of special fixtures or equipment to use in connection with the standard machine.

In the early stages of aeroplane production there was a call for a machine that would shape a particular part of the aeroplane, called the strut. The only method of making these struts up to that time was to work them out by hand, which not only took considerable time, something like two to four hours for each strut, but it required a skillful workman to finish them to the measurements specified by the designer.

To meet this request of the aeroplane builders, many manufacturers of woodworking machines tried to develop and build a machine that would produce these parts automatically. Realizing the fact that a fixture or equipment that could be applied to a standard woodworking machine, with which many woodworkers were familiar, would appeal to the aircraft manufacturers, Baxter D. Whitney & Sons, Winchendon, Mass., manufacturers of woodworking machines, designed a jig, or fixture, for a double spindle shaper. While this jig, or fixture, was original (a basic patent has been granted on this feature), it proved its efficiency from the beginning. With the use of this fixture many leading manufacturers have been able to produce struts at a rate which, three or four years ago, was considered impossible; in fact, the capacity of this machine is only limited by the endurance of the operator.

The only preparation which the stock required was cutting it to the proper length, planed to an even thickness, and sawed to the proper width. The surplus stock was then removed by the band saw, after which it was brought directly to the shaper, and when through with this operation it was of the proper shape and size and practically ready for the fittings. As the wood was worked with the grain, it had a surface equal to the surface left by the cabinet planer, which required a minimum amount of sanding.

The success of the Whitney Company in developing this machine prompted them to supply a demand for a machine which would cut the lightening holes on the aeroplane webs. The old method required a number of operations, such as boring with a bit a hole through which a jig saw could be inserted, and the balance of the cut being made with a jig saw and afterwards smoothed or worked to size on a spindle shaper.

By designing a machine on which the spindles (equipped with a special top and side cutting tool) are raised and lowered by foot power, the number of operations on these aeroplane webs was reduced from three (3) to one (1) operation. This machine, simple in design, embodying no new features except perhaps a new application, has proved to be one of the most economical and efficient tools used in the manufacture of aeroplane woodwork.

This class of work required a machine on which the cutters ran at extremely high speeds, which could only be obtained by means of a motor, the rotor of which is mounted directly on the spindle. By this method of driving the spindles, a speed of 10,000 R.P.M. can be maintained, while it is not practical to try to maintain such high speeds on the belt driven shaper.

Another machine made by the Whitney Company used in aeroplane work is the toothing machine. By passing the sections used in the making of aeroplane propellers through this machine at a rate of 100 feet per minute, a toothed or combed surface is produced that makes better glue joints and more of them in less time than any other method.

In addition to the machines this company makes for the working of wooden aeroplane parts, they also manufacture a cylinder grinding machine that is especially designed to do the internal grinding or finishing of Liberty motors.

INSIGNIA PRESCRIBED FOR AIR SERVICE

OFFICIAL specifications regarding uniforms, insignias and hat cords to be worn by enlisted men in the Air Service have come from the office of Director of Military Aeronautics, Washington, D. C. Attention is called to the regulations which specify that all enlisted men, including candidates for commissions, will wear as a part of their uniforms the blue shoulder cap as described in Special Regulations previously issued and which read as follows:

"Enlisted men of the Air Service shall have a navy blue cap let in at the sleeve head seam and extending down the sleeve 5½ inches from the point of the shoulder. All men as hereinafter specified will wear the insignia as described:

"A four-bladed propeller with center 3¾ inches from point of shoulder embroidered in white; the propeller to be two inches in diameter, two of the blades horizontal and the other two vertical; three-quarters inch above the top tip of the vertical propeller a figure showing the number of the squadron to which the man belongs, one inch high and embroidered in white.

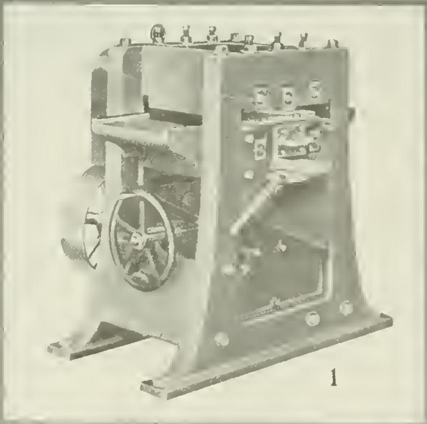
"Aviation Mechanic—Same as above with embroidered circle added, inside of circle to be 1¼ inches from center of propellers, outside of circle to be 1⅜ inches from the center of the propellers.

"Enlisted Aviator—On same blue background shall be embroidered in white the insignia as hereinafter described:

"A pair of wings with a 5-inch spread with crossed propellers between them, each wing to be 1⅞ inches long and ⅞ inch high at the inner edge. Propellers to be one inch across. One-fourth inch above the top of the vertical propeller shall be embroidered the number of the squadron to which the man belongs in figures ½ inch high.

"In the case of candidates for a commission, under instruction in Air Service flying schools, the propeller only will appear upon the shoulder cap, no squadron number or other device to be added. There is no authority for the wearing by enlisted men of the Air Service of any sleeve insignia other than the blue shoulder cap above described, except the specified insignia of grade for non-commissioned officers, and the special chevrons for wounds and war service.

"The hat cord to be worn by all enlisted men of the Air Service, including candidates for commission, will be green piped with black."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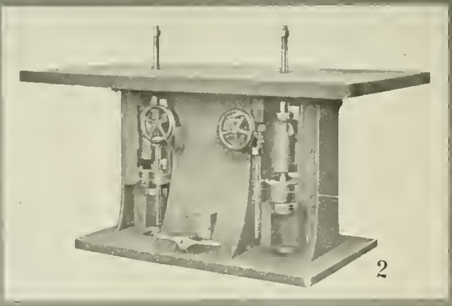
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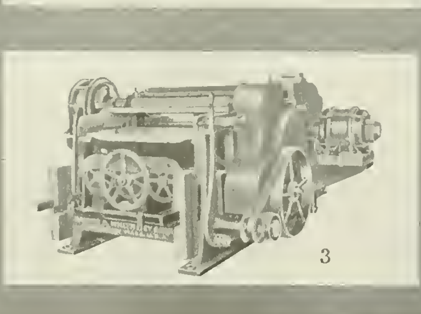
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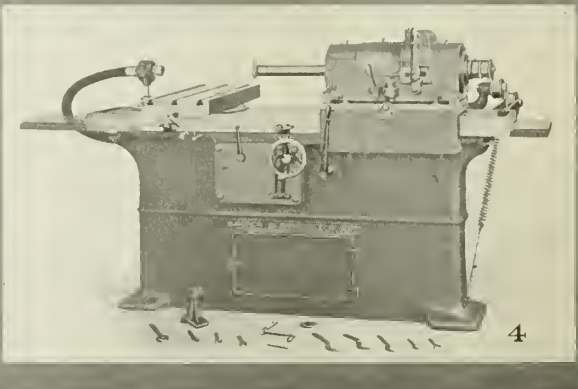
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1—Grinding machine for aeroplane cylinders. 2—Double surfacer for planing aeroplane woodwork. 3—Double spindle shaper for aeroplane struts. 4—Tootbing machine for propeller blade stock.

LT. RALPH E. de CASTRO, ASSOCIATE EDITOR OF AERIAL AGE, CITED FOR BRAVERY

WORD has been received that for the second time he has been recommended for promotion and for the French War Cross for bravery in the aviation service abroad.

Lieutenant De Castro, who has been at the front since last July, has been mentioned in an official communication from the headquarters of the First Aero Squadron, United States Air Service, to the commanding general, First Army Corps. The communication reads:

"On September 7, 1918, Lieutenant De Castro, pilot, and Lieutenant A. E. Easterbrook, observer, First Aero Squadron, were sent on a photographic mission covering a strip of fifteen kilometers, eight kilometers inside the German lines. Fifteen pursuit aeroplanes were available as protection, but the mission was undertaken with but four. Attacked by fourteen enemy machines, they nevertheless continued their mission until almost cut off from the rear. An attack followed, in which one pursuit machine of their protection was brought down. Lieutenants Easterbrook and De Castro returned with the mission partially completed.

"On September 12, 1918, Lieutenants De Castro and Easterbrook were given photographic mission to perform during the attack of the American forces at the St. Mihiel salient. Because of the intense aerial activity they were unable to get pursuit machines as protection and volunteered to perform the mission unaccompanied by protection. Notwithstanding the low-hanging clouds, they penetrated four kilometers into the German lines, and at an altitude of 400 meters exposed eight plates successfully. While engaged in photography they were attacked by four enemy machines, but succeded in completing the mission after fighting off an attack.

"On September 16, 1918, while engaged in taking oblique photographs, they were forced to dive into the German lines to avoid collision with another Allied plane, which suddenly dived on them from above. Under intense anti-aircraft fire and machine-gun fire from the ground they regained their altitude of 800 meters and exposed seventeen plates on the territory behind the lines of German observation balloons, gaining pictorial information of the utmost value."

Describes His Experience

In a letter to his brother, Allen, Lieutenant de Castro describes his experiences:

"In the first place a colonel from the General Staff came to the field in person and ordered some pictures taken, eight or ten kilometers in the German lines, on a strip about 25 kilometers long, the ground to be covered twice, and forty plates to be exposed. I took it somewhat in the nature of a compliment when the job was handed to me, for it was quite a difficult task. Difficult to read the map correctly, so as to find exactly the place and—if I may say so—a job calling for alertness and a little nerve.

"I made arrangements with a chasse squadron on our field to give me a protection group of 12 Spads; to meet me at an altitude of 3,500 meters—about 14,000 feet—over our field. I attained my altitude, but after waiting around about twenty minutes, was joined by only four machines. Of course I had a perfect right to come down, but as my observer was willing I thought I could take a chance also, so we hiked out for the lines, crossing them at 4,000 meters, still climbing. I reached the near end of the strip of country we were to photograph, and told Easterbrook to go ahead. He ducked down in the cockpit and started his pictures, when, woe to me, I saw some Huns below us coming up for all they were worth—two groups of three, and one of two, and far back of us and above us four more.

Lt. Ralph E. de Castro

"So I acquainted my observer with the facts, and told him to go ahead while I kept my eyes on the Huns. They surely did think they were foxy, because the further in I went the further back they went, trying to get around me and cut me off, getting between us and our lines, so that the four overhead could jump us first, and they could keep us from getting out. Then suddenly the four above dived down shooting. I waited no longer, but nosed my machine over and hit it out for our lines at about 150 miles an hour, losing altitude all the time. I guess the Huns never saw such speed in their lives, because I walked right away from them. That's all there is to the story, except, unfortunately, that one of the Spads was brought down.

"We brought the pictures home and when they were developed and printed we discovered some beautiful new battery positions—just what the colonel was looking for.

"By the time you get this letter you all will have something more to celebrate. I can't tell you what, but Boche is going to have the stuffing kicked out of him very shortly, and believe me, if everything goes well it will be a most gorgeous job."

De Castro saw his first action during the fighting around Chateau Thierry. It was after a number of successful flights during the fighting at that place that he was first commended for promotion for his bravery and daring.

Although the application was denied at that time, De Castro wrote his friends that he would soon do something that would compel a promotion and advised them to be on the lookout.

In a newspaper dispatch dated October 3, De Castro is mentioned as one of the aviators in a squadron that dropped three tons of bombs on St. Juvin, causing serious damage. During the action the American airmen downed three Hun planes. De Castro is credited with sending one to earth in flames after shooting the wings off.

American Aviator Gets Seventh Foe

On the American Front in France.—Among the noteworthy feats of the French Aviation Service, which has displayed such wonderful activity during the Allied offensives, is that of Sergeant Major Edwin G. Parsons, who on September 29 shot down his seventh enemy machine.

After a close, long fight, the German machine crashed to earth inside the French lines.

Though he flies in a French escadrille, Parsons is considered here as an American ace.

Already holding the French War Cross, he now has been awarded the French Military Medal, one of the most coveted of French Army decorations. Parsons formerly belonged to the Lafayette escadrille, but did not transfer to the American Aviation Service.

With the American Forces Northwest of Verdun.—American aviators have been busy carrying out bombing attacks on Conflans, Longuyon, Audun, Dommary, Buxieres, Vigneulles, Chambley, Etain, Arnville and Grandpre. In one day they dropped thirty-seven and a half tons of bombs. Abileville, Gorze, Haydenville and Marcq also were bombed.

In twelve days' flying on this front thirty-four successful missions have been undertaken by the American aviators.

With the American Army on the Champagne Front.—During the American activities south of Romagne on October 9 seventy-nine Allied bombing planes passed southward, having bombed Buzancy and other railroad and supply stations behind the German lines.

American pursuit planes took an active part in clearing the air for the bombers, downing four Fokkers in the regions of Remonville and Aincreville. The bombers started out late in the afternoon in groups. After accomplishing their missions the groups met on the way back and passed over the American line in one flock.

New York Aviator Wins Unequal Fight

With the British Army in France.—A young American aviator distinguished himself in the recent great aerial activity over Belgium. He is Lieutenant Walter P. Chalaire, who at the beginning of the war was a reporter on a New York newspaper, and now is in a hospital in England with a bullet wound through his shoulder.

While attached to a British photographic group, Chalaire's machine and another went out over Ostend. On the way back he became separated from the other machine. Soon afterward Chalaire and his observer discovered a large group of German machines above them and another group below the tail of their machine. The enemy groups began a concerted attack.

Chalaire manoeuvred the machine, with the result that two enemy machines were seen to go earthward in a spin.

THE PANHARD—300 H.P. (DIRECT TYPE AVIATION MOTOR)

By E. H. SHERBONDY

THE Panhard Company have had in the last periods, a number of different types of aviation motor of novel construction and were amongst the very first motor firms to make use of steel cylinders, they having produced some steel cylinder motors in 1903, which practise was followed up in 1908 by the development of four sizes of aviation motors, steel cylinders, copper water-jacketed and employing a novel concentric valve construction. These motors were very well designed and built and were of very light weight.

In 1912 they produced a couple of V-type eight-cylinder motors of conventional form, employing cast-iron cylinders (*L-head arrangement*). The motor here described is designated as (V-12-J) and comprised of twelve cylinders, two rows of these set at an angle of sixty degrees from one another.

The bore is 115 mm. or 4.52 in. and the stroke is 170 mm. or 6 11/16 ins. The motor is operated either at 1,350 R.P.M. at which speed it gives 240 H.P. or at 1,700 R.P.M. at which speed it gives 340 H.P.

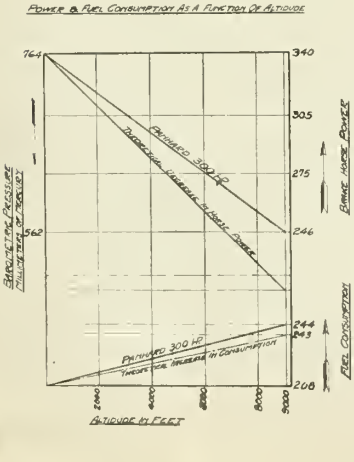
The cylinders are individual iron castings, with a single set of valves inclined at an angle of 30 degrees from one another and are operated by camshaft system, novel in form. The camshafts and excessory drives are by no means of bevelled and helical gear trains, as is now the accepted practise on aviation motors.

The camshaft is of novel form, having seven main bearings of very large diameter and disc crank cheeks. A forked-type of connecting rod is used of (I-beam section). Lubrication is fully forced and the oil pump is mounted exterior to the crankcase.

The Panhard type carburetors, equipped with the Panhard Automatic Compensator, are placed inside the (V) of the motor. Water circulation is insured by means of two centrifugal pumps, at right angles to the crankshaft and driven by means of spiral gearing. When the air starting system is provided, air being distributed to automatic valves in each cylinder, by means of a disc distributor plate, mounted on the propeller end of the camshafts.

The design of a motor in many particulars is unconventional, as will be seen by close persual of the accompanying drawings.

(Figure 1) is a section through the motor at right angles to the crankshaft.

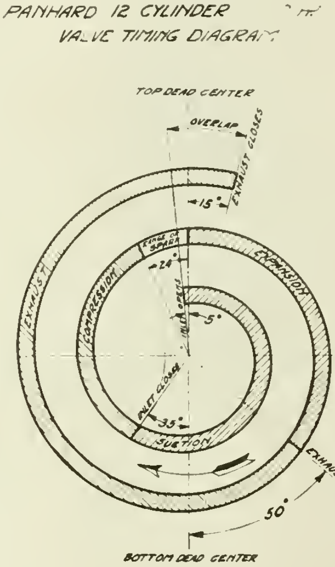


The Camshaft

The camshaft and rocker arm train are mounted in an aluminum housing which is attached to each of the cylinders by means of four studs. The camshaft is drilled straight through 15 mm. or 19/32 in. The outside diameter of the camshaft is 25 mm. or (1 in.)

The root diameter of the cams is 35 mm. and the camshaft is 850 mm. or about 33½ ins. long and is carried in seven bearings.

In plane with the camshaft and immediately above it, there is mounted a steel tube of 15 mm. outside diameter and 9 mm. inside diameter, which serves both as an oil gallery for distributing oil to the camshaft bearings and also as a shaft on which the rocker arms are mounted, resulting in a very neat and compact valve operating gear. The oil leakage from the camshaft train is carried to the bevel far end of the shaft, through the bottom of the case and drains back to the crank chamber, through the distribution gearing.



Cylinders and Valves

The cylinders are of cast-iron, 115 mm. bore and are completely water-jacketed. Core plates being provided on the adjacent sides of the cylinders. The valve ports are 56 mm. in diameter, 2.2 in. The valves are 62 mm. or 2.4 in.

The cylinders are retained in the crankcase by means of eight studs per cylinder.

Pistons

The pistons are cast of aluminum, 90 mm. long and carry four cast-iron rings, 6 mm. wide or .24 in. and have six internal ribs. The skirt is drilled with six 12 mm. holes, for caring for excess oil.

The wrist pin is unusually small, only 20 mm. in diameter or .78 in. and is mounted 40 mm. from the bottom of the piston. The piston head thickness is 7 mm. —.27 in. at the bottom of the cylinders, there is provided aluminum splash cups to prevent over-oiling of the cylinders.

Connecting Rods

The connecting rods are 292 mm. center to center—11.4 ins. The web and flange thickness is 2½ mm.

The Crankshaft

The crankpins are 62 mm.—2 7/16 ins. diameter and the main bearings, of which there are seven—116 mm. 4.5 in. diameter and 40 mm. or 1.5 in. long and the hole through the shaft is 100 mm. straight through. The crank cheeks are circular —210 mm., 8.2 in. and are 10 mm. or .39 in. thick and are provided with annular grooves for carrying oil from the main bearings to the crankpins.

The Crankcase

The crankcase is split horizontally, the lower crankshaft bearing seats being integral with the crank chamber and a steel oil pipe is cast in this member for distributing oil to the seven main bearings and the crankpins.

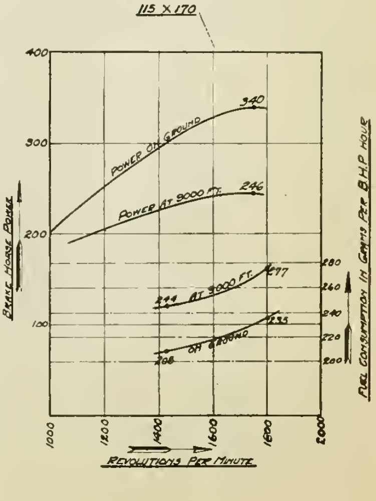
A very deep pressed aluminum oil reservoir is attached to the bottom half of the base. It is provided with a horizontal screen, separating the two (2) portions of the base.

The motor is supported by means of two steel cross tubes, 52 mm. or approximately .2 in. diameter and movement of these tubes in the crankcase is prevented by means of pinch bolts in the bosses, through which they attain a slightly higher efficiency than is attained with a normal motor.

In Figure 3 is given a timing diagram of the motor. The inlet valves open five degrees. The cylinder arrangement on a base is unsymetrical, owing to the fact that the cylinders are offset 20 mm. or .78 in. This offsetting results in decreased guide pressure and permits in ten degrees overlap from the valves, after the top dead center and close 35 degrees after the bottom dead center.

When tested on the ground these motors gave 340 H.P. at 1,750 R.P.M. with a specific consumption of 208 grams per H. P. hour or .452 pounds per H.P. hour.

At 6,562 feet altitude with barometric



pressure of 604 mm or 23.78 ins. the motor gave 272 H.P. at 9,000 feet altitude with barometric pressure of 562 mm. The motor gave 248 H.P. with a consumption of 244 grams.

The power of the motor is absolutely proportional to the density of the air drawn in and it gave 300 H.P. at 1,420 turns on the ground.

Aeroplane Apparently Stands Still While Soaring at Height of 5,000 Feet

Hovering over the city of Dayton like some huge bird with wings outspread but unable to make headway through the air, an aeroplane from McCook field was the magnet which drew thousands of pairs of eyes to it about 9 o'clock on Oct. 5. For fully 15 minutes the ship seemed not to move an inch, except in a steadily downward direction which was so slow as to be almost negligible to the vision of the naked eye. The pilot of the still craft was E. A. Johnson, a civilian flyer at McCook field.

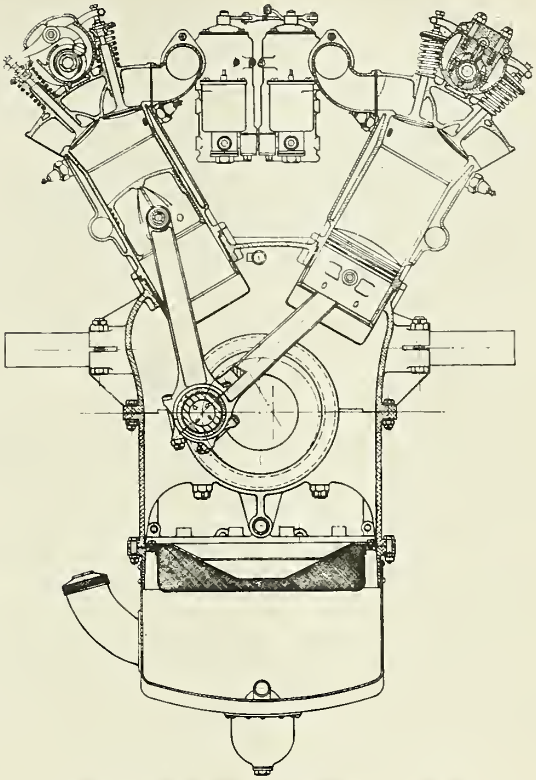
The effect of the machine's apparent stillness was produced by Pilot Johnson equalizing the power of his motor against the wind resistance which was particularly high at 5,000 feet, where he first began his stunt. This had the effect of bringing the machine to a standstill except for the natural fall which came with the gravity of the heavier-than-air craft. Even the gravity was minimized by the outspread wings to such an extent that fully minutes was required for the drop of 3,000 feet.

The particular skill in the stunt, as pointed out by expert flyers, was that of keeping the ship on even keel while suspended. The nose, being heavier than the tail of the machine would have sent it head down and a nose-dive would have resulted had not the pilot held the machine even.

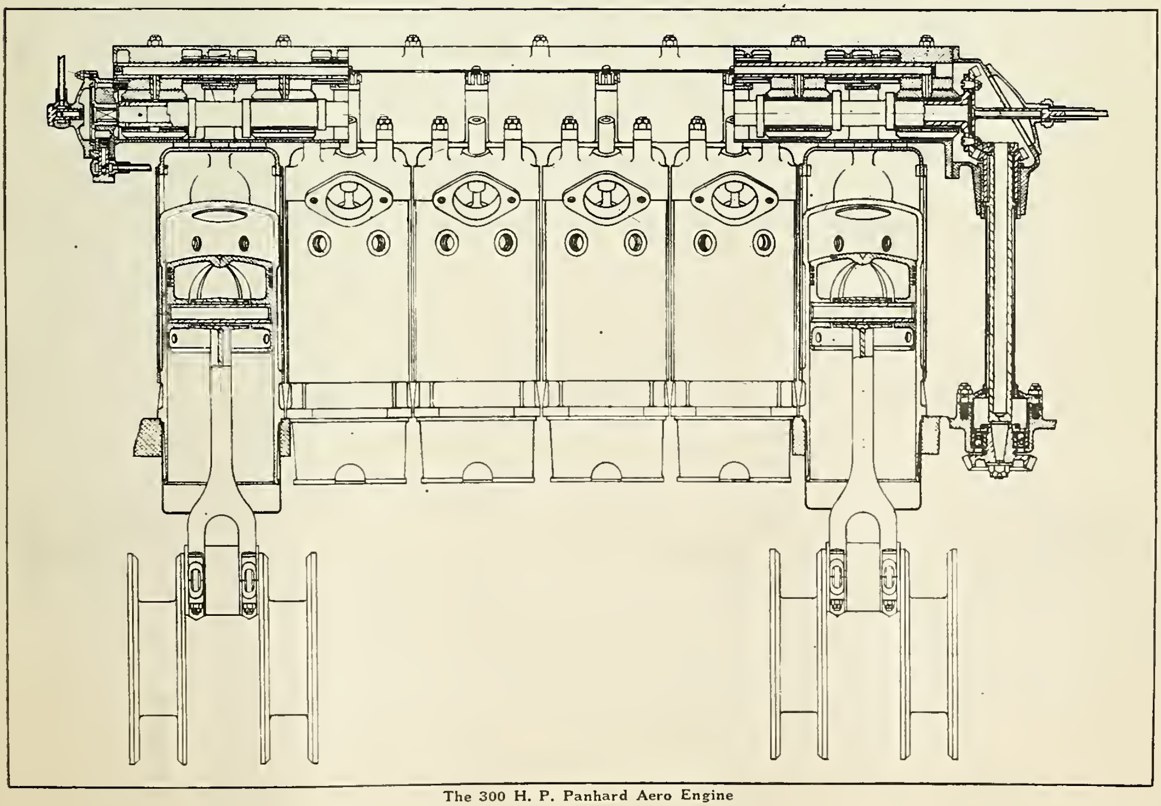
Second Provisional Wing Honors its Colonel

The officers of the Second Provisional Wing, U. S. Air Service, recently gave a dinner and dance in honor of their commanding officer, Lieutenant-Colonel S. W. Cook.

The Second Provisional Wing is made up of fully trained men and is operated identically as aviation units at the front. The entire wing is under canvas and ready to depart at any moment, with or without railroad facilities. It is composed of Corps d'Armee, bombardment and pursuit squadrons.



End view of the 300 H. P. Panhard Aero Engine



The 300 H. P. Panhard Aero Engine

THE LONDON ENEMY AIRCRAFT EXHIBIT

THE ROLAND CHASER D II

By G. DOUGLAS WARDROP

VERY frequently the Allied airmen encounter the Roland biplane in combat and consequently the machine on exhibit in London is of immense interest at the present time.

The dimensions of the Roland D. II are very small:

Span of upper plane	8.90 m.
Span of lower plane	8.50 m.
Length overall	6.95 m.
Height	2.95 m.

Its weight—827 kilogs.—with full tanks is slightly greater than that of the Albatros D.III chaser. The lifting surface being 23 sq. m., the wing loading is 36 kg./sq. m. (7.2 lbs. sq. ft.).

Fuselage

The construction of the *fuselage*, and its peculiar shape, merit special attention. Being built entirely of three-ply wood and covered with fabric, it is of the monocoque type, of oval section, and terminates at the stern in a vertical knife edge. The construction is excessively light, the framework consisting of very thin longerons running through the whole length of the body, the curves of which they follow. Rigidity is only provided by the ply wood, made in two halves joined along the middle of the top and bottom. The total thickness of the six layers is only 1.5 mm. From the pilot's seat to the tail there are only four formers of very small thickness.

Between the pilot's seat and the motor the *fuselage* forms a projection tapering upwards to form at its upper extremity an edge 0.11 m. wide, to which are attached the radiator and the top plane. The top plane is cut away to accommodate the radiator. This arrangement of an upward projection of the body itself takes the place of the *cabane*. On the lower part of *fuselage*, and built integrally with it, there are the rotts to which the two halves of the lower plane are attached. At the rear the tail skid, of wood with a shoe of metal, pierces the *fuselage*, and is supported on a projection of ply wood similar to that employed on the Nieuport.

The pilot is placed very high, and has in front of him two wind screens, one on each side of the central structure carrying the upper plane. The view in a forward direction being thus divided would appear to be inferior to that obtainable in other types of machines.

Planes

The planes are of trapezoidal plan form, of unequal span, without stagger and dihedral angle, but with a sweep-back of 1.5°. The chord, which is uniform, is 1.45 m. and the gap 1.34 m. The ribs are at right angles to the leading edge. As the inter-plane struts are secured to the spars over the same rib, it follows that in the front view the struts do not come quite in line. The spars of the upper plane, which are of spruce, are spaced 0.83 m. apart, the front spar being 0.13 m. from the leading edge. The ribs, of which there are 12, are of I section with flanges of ash. They are spaced about 0.37 m. apart. In the middle of each interval there is a false rib running from the leading edge to the rear spar. In each wing there are four compression members in the form of steel tubes 25 mm. diameter. These tubes are evenly spaced, the distance between them being 1.30 m., and are braced by 3 mm. piano wire. Between the front spar and the leading edge there are two tapes running parallel to the spars and crossing alternately over and under consecutive ribs. Two more tapes are similarly arranged between the spars. Certain corners are stiffened by reinforcement by ply wood. Each of the upper planes carries an *aileron*, which is not balanced and of equal chord throughout. A strip of three-ply wood, under the fabric, covers and protects the hinge fixed on the rear spar. The *aileron* measures 1.82 m. in length and has a chord of 0.42 m. Its leading edge is a steel tube of 30 mm. diameter. The *aileron* cranks are operated, as in the Nieuport, by two vertical tubes. In the left top plane is mounted a petrol service tank. Openings in each of the halves of the top plane accommodate the radiator. The upper planes are attached direct to the highest portion of the *fuselage* by means of special bolts resembling somewhat those used on the L. V. G. C. IV.

The lower planes are constructed in much the same manner as the top ones. The spars are similarly arranged and are consequently the same distance apart. In each wing there are 10 ribs, of which nine measure 0.01 m. and the last one 0.025 m. Between the ribs are false ribs measuring 10 mm. The internal wing bracing is the same as that of the top plane, but the distribution of the four steel tube compression struts (of which one is 20 mm. and the other 25 mm.) is somewhat different. From the first to the second is 1.17 m., from the second to the third is 1.13 m., and from the third to the fourth 1.11 m. The lower planes are attached to wind roots built integrally with the fuselage. The angle of incidence is 4° at the second rib and 3° at the seventh. The interplane struts are in the form of steel tubes 0.025 m. diameter, stream-lined with a wood fairing which brings their depth to 0.09 m.

The Tail

The shape of the tail can be seen from the plane view of the machine. The fixed tail plane is built of wood, while the two elevator flaps are constructed entirely in metal.

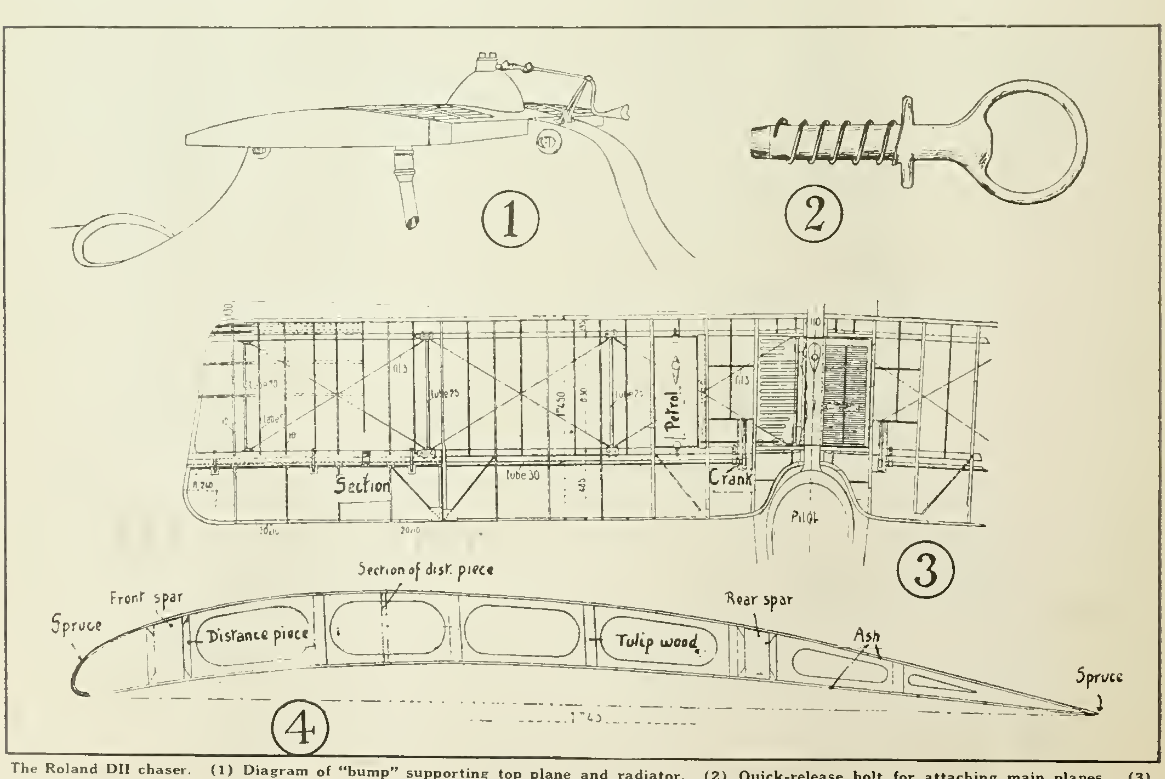
A note should be made of the attachment of the tail plane to the body. The leading edge of the tail plane is hollowed out, and into the hollow space thus formed fits a piece of wood which runs across the *fuselage* and the ends of which project 0.50 m. on each side. Further rigidity is given to the structure by two stream-line tubes running from the tail plane to the rudder hinge on the vertical fin. The rudder, which is roughly rectangular with rounded corners and has a forward projection for balancing, is built up of steel tubes, while the fin, which is made integral with the body is of three-ply wood.

The elevator cables, which are attached to a central crank lever, are enclosed inside the body except for the last meter or so from the stern.

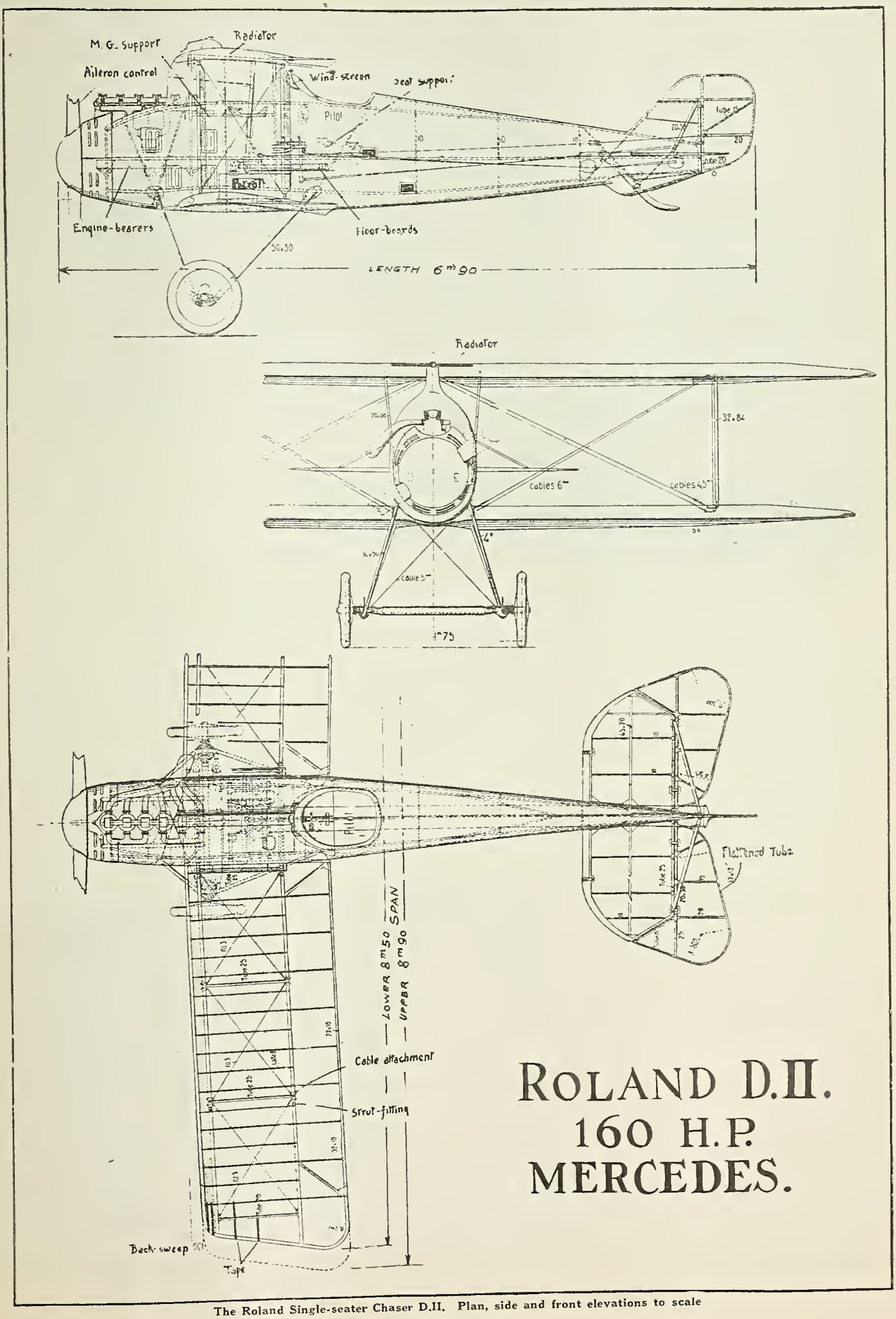
Engine

The engine fitted on the Roland D. II is a 160 h.p. Mercedes six-cylinder vertical engine. The exhaust collector is nearly horizontal, and is placed on the starboard side. In addition to the gravity tank in the top plane there is a main gasoline tank measuring 70 x 70 x 25 under the rudder bar. The airscrew having been smashed it has not been possible to iden-

(*Continued on page* 312)



The Roland DII chaser. (1) Diagram of "bump" supporting top plane and radiator. (2) Quick-release bolt for attaching main planes. (3) Upper plane. (4) One of the main plane ribs



The Roland Single-seater Chaser D.II. Plan, side and front elevations to scale tify it. It had its boss enclosed in the usual "spinner."

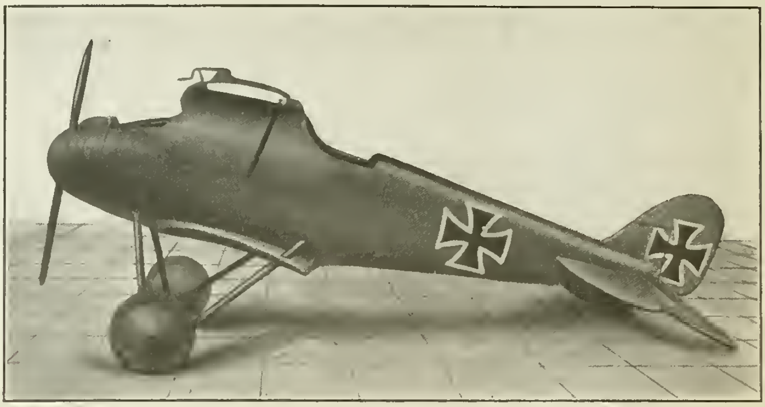
Armament

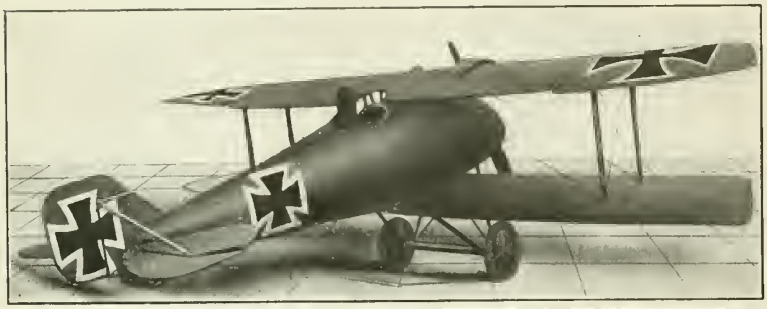
Two fixed Spandau guns are operated by the motor. They are mounted one on each side, and do not project through the *fuselage* covering until just at the extreme front.

Undercarriage

The undercarriage is formed by two pairs of Vee-struts, braced diagonally by two crossed cables. Their attachment to the *fuselage* occurs at two sloping formers. The axle, which is placed between two cross tubes, is enclosed in a stream-line casing. The track is 1.75 m. The wheels measure 760 by 100. The shock absorbers are of rubber.

It has been said of the Roland D. II that owing to its light construction the *fuselage* is apt to get out of shape, and that it has a tendency to spin. As up to the present no test of this machine has been possible, our opinion can only be based on the testimony of our aviators. From this it appears that this machine, of new conception, must be counted among the best of German chasers. The Roland D. II single-seater enters still into the composition of certain enemy squadrons.





Side view of the Roland DII chaser

Starboard quarter view of the Roland DII chaser

LIBERTY WALNUT PROPELLERS AND THE MEN WHO ARE BEHIND THEM

WHEN in the course of present events we witness the adaptation of America's plants and products to the needs of the hour, especially when a great industry springs therefrom, we have the source for inspiration. Such a feeling of inspiration will come to any one who visits to-day the industries of George W. Hartzell in Piqua, Ohio, which is in the Miami Valley, where birth was given to Aviation by the Wright Brothers, of Dayton.

Piqua is located in the Miami Valley only a few miles from Dayton, the aviation center of the world, and there for many years George W. Hartzell has been in the lumber business, the Hartzell Walnut Lumber Mills being among the most prominent in the country. George W. Hartzell has been in the lumber business for thirty years; and the last fifteen years has specialized exclusively in walnut. Every carload, trainload, wagonload of walnut logs that you will come across en route in the Miami Valley will very likely be found on inquiry to be destined for the Hartzell Mills at Piqua.

Realizing, when America became involved in the great war, the value of walnut in the manufacture of many things that the Government would need in its war program—and because of his knowledge and experience in everything pertaining to walnut—George W. Hartzell placed his experience and facilities at the command of the country. Here experience in walnut has turned out everything from steering wheels to gun stocks—but probably the most important item being a splendid Liberty Walnut Propeller for aeroplanes.

The Hartzell Walnut Propeller Co. is probably the only factory in the country that is to-day turning out solid four-blade propellers, which are more difficult to manufacture than the two-piece. In fact the Hartzell Walnut Propeller Company is one of the early pioneers in the propeller industry and they claim to be among the few propeller companies to-day who maintain an engineering department which is actually *designing* propellers.

A recent job of which they are most proud is the special propeller just designed at Piqua for Gallaudet. The chief engineer at the Hartzell plant, whose photograph accompanies tbis article, is Frederick Charavay, who came to the Hartzell Company following a long experience with the Wright-Martin Aircraft Corporation. Mr. Hartzell considers Mr. Charavay one of the foremost propeller designers in the U. S.

Robert N. Hartzell, a son of the founder of the Hartzell industries, is manager of the propeller plant, and both the quantity and quality of their production testify to the efficiency of his management.

Robert N. Hartzell, Manager

Harry B. Wise, Sales Manager

Frederick Charavay, Chief Engineer

Caquot observation balloons in flight at a balloon training school in the United States. These balloons are all American made, being modeled on the invention of Captain Caquot, of the French Army. Up till a short time ago the Caquot Model M was used by the British and French Air Services exclusively. The American manufacturers have made several improvements, however, and are now turning out the Model R Caquot. One of the chief differences is that the Model R has the safety valve in the bow of the balloon, while the Model M has it in the middle of the starboard side. The angle of flight is very well illustrated in this photograph, the normal angle being but several degrees above the horizontal. The balloon on the left is probably, judging from its flight angle, in process of being hauled down. In the old style kite balloons, and in fact in the case of the present day German Drachen balloons, the angle of flight very nearly approximated forty-five degrees above the horizontal. This, it can be easily seen, imposed a much increased strain on the cable and militated against the very necessary steadiness of the balloon for observation purposes. © Committee on Public Information.

GOODYEAR PERFORMANCES

E. E. HELM

THE recent performance of the Goodyear Airship D-12 in a 360-mile flight from the Goodyear Balloon Field, near Akron, to Dayton, Ohio, and return, not alone marked the first successful long-distance airship flight made in this country, but the accomplishment was noteworthy in that it is indicative of the possibilities of this important branch of our aeronautic service which has heretofore commanded but a small share of public attention because of the predominance of an almost unlimited aeroplane program. This journey of the D-12 which was the longest any American airship ever made with a definite objective, also brought to the public attention the part that the Goodyear Tire & Rubber Company of Akron has played in the development of aeronautics.

It was back in the summer of 1910 that the officials of the Goodyear Company decided to enter the field of aeronautics which was then in its infancy. At that time the wings of aeroplanes were covered with rubberized fabric, and the company sent two of its men to Europe to investigate and report on European methods of manufacturing aeroplane and balloon fabrics. Following this, in the spring of 1911, entered in a small way into this field, and from that time on it has developed both its experimental and manufacturing facilities until to-day this company stands at the front of American balloon builders. After the elimination of rubberized fabric in the construction of aeroplanes, Goodyear steadily devoted its attention to developing lighter-than-air craft of all kinds, and now is helping the Government, both in the making of airships and in the training of men to operate them for war purposes.

Goodyear's success in balloon construction is due primarily to the foresight of its officials; but playing an important part in the development of this industry were two young men especially well equipped for the work by reason of their educational attainments as well as their courage and initiative. These men are R. A. D. Preston, now a lieutenant in the balloon service of the U. S. Navy, and Ralph H. Upson.

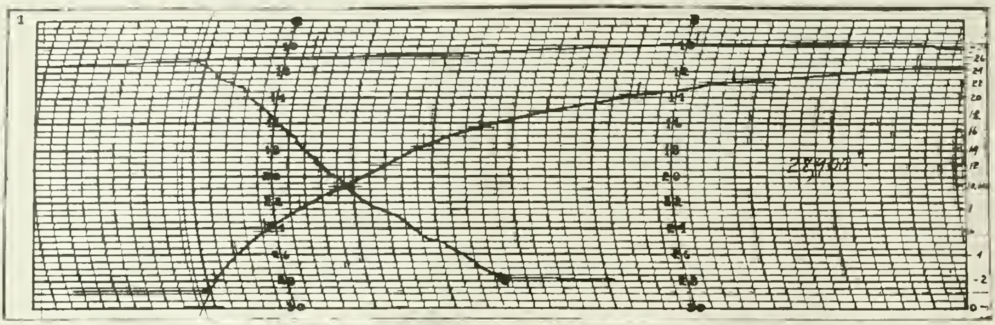
Around these men Goodyear built up its balloon business. They qualified as pilots early in their careers, and have studied and worked in every branch of the business, from making the fabric to piloting the balloons and airships. From this nucleus has been developed at Goodyear a corps of balloon experts second to none in the world.

It was in 1912 that Goodyear built its first spherical balloon, an 80,000 cu. ft. bag that gained world-wide fame as a winner of both the American National race and the International race. This balloon was designed and built by Ralph H. Upson, and was christened "Goodyear." In the summer of 1913, with Ralph Upson as pilot and R. A. D. Preston as aide the "Goodyear" won the American National race. This race was started from Kansas City, and there were twelve entries. In the fall of 1913, the "Goodyear," with the same crew, was entered in the great International race at Paris, being one of twenty starters. Here again victory crowned the efforts of those two intrepid young men and brought world-wide fame to them and to Goodyear. In July, 1914, just before the beginning of the war, the "Goodyear" again won the American National Race at St. Louis, with R. A. D. Preston as pilot. Thus Goodyear had two pilots eligible for the 1914 International race—Upson having already been selected to lead the American team on account of winning the previous International. The breaking out of the war, however, prevented any further competition.

The war brought new balloon problems, and Goodyear kept not only abreast, but a little bit ahead of the world's developments.

At the outbreak of the war The Goodyear Tire & Rubber Company was the only experienced manufacturer of rubberized fabric balloons in this country. The moment the Government balloon program was officially decided upon and Goodyear given a contract to build the first Navy Blimps, work was started on an immense hangar, hydrogen generating plant, and dormitories and other buildings for accommodating a large class of balloon students. Within two months after ground was broken, Goodyear was operating a balloon school and training student officers who were to be the nucleus to start the training courses at the six Naval Air Stations along the Atlantic seaboard as soon as their construction was completed. In May, 1917, the first complete airship made by Goodyear, the D-2, made a flight from Chicago to near Akron, with Ralph Upson as pilot and Herman Kraft as aide. This feat marked the practical beginning of airship construction and operation in this country.

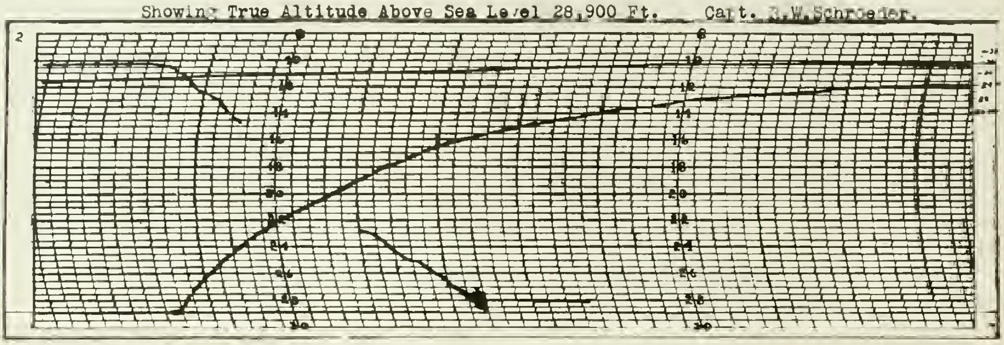
From this time on the balloon industry at Goodyear has grown by leaps and bounds, until now huge airships flying about over the city of Akron and the surrounding country is a common sight. So too, the uniform of Uncle Sam's naval force is a familiar sight on the streets of the Rubber City, for Goodyear's balloon activities have made Akron the center of a naval colony.



Ceiling, Bristol U.S.B-1
Propeller X5409
Temperature 19 °Cent.

300 H.P. Hispano-Suiza
Barometer 28.85
Sept. 18th 1918

Showing True Altitude Above Sea Level 28,900 Ft. Capt. R.W.Schroeder.



Charts showing altitude curve of Captain Schroeder's world record flight

CAPT. SCHROEDER'S STORY OF ALTITUDE RECORD

By CAPT. R. W. SCHROEDER, U. S. A., A. S., Holder of World's Altitude Record

I HAVE been connected with Aviation since 1910, and during that time I have worked as a mechanician for some of America's leading pilots, and have gained a very valuable training. I was always a keen scholar and took every advantage to learn all I could, and I dare say that all my past experiences have been very beneficial to me in my efforts to establish a new World's Altitude Record. The last World's Altitude Record held by America was in August, 1911, when the late Lincoln Beachey made a climb to 11,000 and some odd feet at the big aviation meet in Chicago, Ill.

It is to be understood that, for military reasons, I am unable to give a more complete description of the improvements and changes which I made in the motor. However, I am proud to say that the motor was an American-built motor, as well as the carburetor and magnetos, and that the discoveries which were made in these experimental climbs are for the use of the United States Government.

In order to take an aeroplane to a higher altitude than any other pilot in the world, I found that it would require more than one or two attempts. I made three attempts. The first one took me to an altitude of 24,000 feet, the second to 27,000 feet and the last one to 28,900 feet; but now I feel cetrain that with a few changes and improvements, I can get to 30,000 feet or better.

Flew Five and a Half Miles High

The altitude reached is only 102 feet short of the highest mountain peak in the world, the great Himalaya peak, which 29,002 feet high. Most people cannot stand high altitudes, d from 10,000 to 15,000 feet they bleed at the nose and ears. had been to 12,000 feet at different times and experienced no fficulties. After being put in charge of the Testing Squadron t Wilbur Wright Field, my duties required me to go to the eiling with all new types of high powered battle aeroplanes, which were being experimented with by the United States Government. (By ceiling, I mean the highest altitude that the aeroplane can reach. During these trips I would quite often go without the use of oxygen, and in time I discovered that I was becoming accustomed to the rare, thin air. However, I did not seem to be able to go above 23,000 feet at any time without feeling a sort of sleepy, tired, cross and hungry feeling, which I was unable to overcome except by the use of oxygen. Without the use of oxygen at these altitudes, I would feel that I was doing everything just right, and even if the aeroplane would get into some critical position and I could see when I looked down that the earth that should be underneath me was not there any more, but was way over on the other side of the machine, yet I believed that I was flying all right, and that my flying position was right, but the earth was in the wrong place. So after having these experiences, I decided that I would have to overcome these dangers, and the way I did it was to keep my mind on one thing; and that was, when the earth is in the wrong place, use oxygen. This I did, and found that it worked out very well.

Cold Great Handicap

The cold, thin air is one's great adversary. First of all, one must make a study of the performance of his motor at these high altitudes. This I did, and made the necessary changes each time before trying again. A very positive oxygen regulator and face mask should be used. These were unobtainable, for the sets I had previously tried out had failed to function above 21,000 feet. Furthermore, the face mask pressed so tight to my face that it interfered with the flow of blood and my face grew numb, so I used a rubber hose direct from the oxygen bottle, which I regulated with a valve on the bottle. The hose was placed in my mouth so that I could breathe air and oxygen at the same time. I also pressed my tongue against the end of the hose in order to tell if the oxygen was still flowing. This method was very satisfactory, except that the oxygen bottle and the rubber tube gathered about a quarter of an inch of frost, which made it very unpleasant.

The following experiences and sensations I noticed during my flight were due to lack of oxygen. I took off at 1:45 p.m. Wednesday, September 18th, 1918, and made a steady circular climb, passing through clouds at 8,000 feet, 12,000 feet and 16,000 feet. While still climbing in large circles my goggles became frosted, making it very difficult for me to watch my instruments. The temperature at this altitude was 2 degrees below zero, Centigrade. When I reached 25,000 feet I noticed the sun growing very dim, I could hardly hear my motor run, and I felt very hungry. The trend of my thought was that it must be getting late, that evening must be coming on and that was the reason the sun was getting so dim. But I was still climbing, so thought I might as well stick to it a little longer, for I knew I could reach by ceiling pretty soon, then I would go down and, even though it were dark, I could land all right, for I had made night landings many times before; and so I went on talking to myself, and this I thought was a good sign to begin taking oxygen, and I did. I was then over 25,000 feet and the temperature was 60 degrees Centigrade below zero.

Capt. R. W. Schroeder who made the world record

As soon as I started to inhale the oxygen the sun grew bright again, my motor began to exhaust so loud that it seemed something must be wrong with it. I was no longer hungry, and the day seemed to be a most beautiful one. I felt like singing with sheer joy as I gazed about through the small portion of my goggles, which had no frost, due to a drop of oil which had splashed on them from the motor.

It was wonderful to see the very clear blue sky with the clouds thousands of feet below. The frost on my goggles bothered me very much. At times I had to remove my glove in order to put the warm palm of my hand on the glass to thaw the frost. I did this every few minutes so that I could take the proper readings of the instruments, which I marked down on my data pad. I believe that if my goggles had been better ventilated they would not have frosted. When I was about 27,000 feet, I had to remove my goggles, as I was unable to keep a steady climb. My hands by this time were numb and worried me considerably. The cold, raw air made my eyes water and I was compelled to fly with my head well down inside the cockpit. I kept at it until my oxygen gave out, and at that point I noticed my aneroid indicated very nearly 29,000 feet. The thermometer showed 62 degrees below zero, Centigrade. The lack of oxygen was affecting me and I was beginning to get cross, and I could not understand why I was only 29,000 feet after climbing for so long a time. I remember that the horizon seemed to be very much out of place, but I felt that I was flying correctly, and that I was right and the horizon was wrong.

His Motor Stops

About this time the motor quit. I was out of gasoline, the propeller stopped and everything was quiet, so down I went in a spiral. When I had descended to about 20,000 feet I began to feel much better, and realized that the lack of oxygen had affected me. I passed down through the clouds at 16,000 feet, and, as I remember, it was snowing from these clouds upon the next layer, some 4,000 feet below. I am not positive as to this, as I may have been affected by the lack of oxygen. I noticed as I descended that the air seemed to be very thick and stuffy, but very nice and warm.

During the entire trip I did not see the ground, from the time I went up through the clouds above Dayton, Ohio, until I came down through the clouds again at 4,000 feet above Canton, Ohio, over 200 miles from where I started.

I was lost, beyond a doubt, with a dead engine, over very rough country. I landed O. K. and broke the tip of my propeller, which was standing vertical, when I rolled into a depression in the ground. However, I did not nose over or do any other damage to the aeroplane or myself.

My hands and face were numb, my lips and four of my fingers were frozen, and required medical attention. Electrically heated clothing would have been very well used, but I dressed as light as possible to avoid the extra weight, as I had stripped the entire aeroplane of all unnecessary load. This was done to assist me in climbing.

Two barographs were arranged in the aeroplane, which recorded the climb on a small paper drum. I also had a thermometer out on the wing strut, which showed the temperatures. The two barograph papers and the temperatures were sent to the officials of the Aero Club of America, who called a meeting of their Board of Governors, and the result of their meeting gave me an official World's Altitude Record of 28,900 feet. The Club has sent notification of this record to the International Aeronautic Federation, and to the Pan-American Aeronautic Federation, so that the record will be recognized by all the aeronautic bodies all over the world.

Aerial League and Pacific Aero Club Elect Captain Lipsner Honorary Member

The Aerial League of America and the Pacific Aero Club have elected Captain Benjamin B. Lipsner, the Superintendent of the Aerial Mail Division, honorary member.

The communication from the Pacific Aero Club follows:

Captoin Benjamin B. Lipsner, U. S. A.
Superintendent, Aerial Mail Division
Washington, D. C.

Dear Sir:

You are hereby notified that you have this day been officially made an Honorory Active Member of the Pacific Aero Club (no expense) as an expression of the high esteem in which you are held by this orgonization, and in consideration of the great work you have done in furthering the Aerial Mail Routes.

Very cordially yours
Pacific Aero Club.

Membership cord enclosed

(Signed) Chas. F. Pond,
Rear Admiral, U. S. N., President.

Could End the War with Planes

Representative Reavis, who has recently returned from "Over There," having been under fire on the front with the American troops in the advance beyond Chateau Thierry, says the thing needed in France more than anything else is aircraft.

German machines are flying low and sprinkling American forces with murderous machine gun fire, in many cases without interference or opposition, except from rifles and revolvers in the hands of the soldiers. The Liberty motor in very limited quantities is now reaching France, but the failure to have sufficient aeroplanes in France has been disastrous in the extreme.

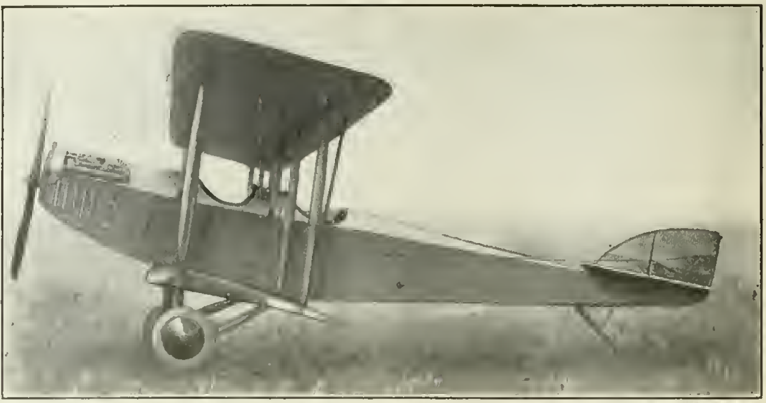
"Congressman Bland and I were with General Pershing when the report was brought in of the Alabama boy of F Company of a certain regiment of the Rainbow Division, who had brought down a Boche plane with his rifle. The general said, 'If that lad will just get four more, I will make him a ground ace.'

"If we can get sufficient aircraft and the transport of troops is maintained at the present rate, I have a firm hope that the war may be closed up by the fall of 1919."

THE CONTINENTAL KB-3T TRAINING TRACTOR

By John F. McMahon

Photos and Text Passed by Censor



THE Continental Aircraft Corporation's new training tractor KB-3T recently tested at Amityville, has come up to all expectations of the designer Vincent J. Buranelli. The short "over-all" length of this machine, 23 feet 4 inches, is noteworthy and characteristic of Continental machines.

Mr. Buranelli's chief object in designing the KB-3T was to produce a training machine that could be cheaply constructed. This has been accomplished by an extensive use of one-piece standardized fittings. Another point of interest is the distance between forward and rear struts, this arrangement does away with the usual bent steel brace in back of observer. A very complete list of measurements and weights are given which should prove useful in checking up with other machines.

General Specifications

Span upper plane	40′ 3″
Span lower plane	34′
Chord both planes	5′ 6″
Sap	5′ 4″
Stagger	6″
Length over all	23′ 4″
Height	9′ 3″
Net weight	1,340 lb.
Useful load	540 lb.
Gross weight	1,880 lb.
Motor, Curtiss	O X 100 h.p.
Speed range	45-75 m.p.h.
Climb in ten minutes	3,200 feet

Weights

Upper planes	118 lb.
Lower planes	102 lb.
Struts	30 lb.
Wires and turnbuckles	20 lb.
Fittings and bolts	18 lb.
Total	288 lb.
Fuselage	310 lb.
Seats upholstered	12 lb.
Stick controls and mountings	17 lb.
Dash with instruments	13 lb.
Total	352 lb.
Ailerons	24 lb.
Elevators	16 lb.
Rudder	10 lb.
Vertical stabilizer	3 lb.
Horizontal stabilizer	19 lb.
Control cables	16 lb.
Total	88 lb.
Motor complete	390 lb.
Propeller	22 lb.
Radiator and piping	53 lb.
Gas tank and gauges	22 lb.
Exhaust pipe	16 lb.
Total	503 lb.

Landing chassis and incidentals = 109 lb.

Planes

The wing curve is Eifel 36. The planes are set with an angle of incidence of 2 degree-30′. Top and bottom are the same. The tips of planes are slightly rounded as is in general use on Continental machines. There is no sweepback, but a dihedral of 1 degree and a stagger of 6″. The upper planes are made in two main sections with a three-foot panel over the body. The lower plane is in two sections and attaching to the body. Wing beams are of "I" section and made of Douglass fir. The overhang is braced by a steel strut made of ⅞″ seamless tubing with a fairing of spruce.

The struts are of streamline section, the maximum 3¾″ x 1½″ occuring at the centre, and tapering in proportion to each end where it sets into a special strut socket. Flying cables are double 5/32″ in inner panel, ⅛″ outer panel, landing wires are single of the same sizes. Double drift and single trueing wires are used. All control wires are internal.

Ailerons on top planes only, and are 11′ x 1′6″. Where ailerons are attached, a bevel on the aileron permits the surface to be moved without a space occuring between aileron and wing.

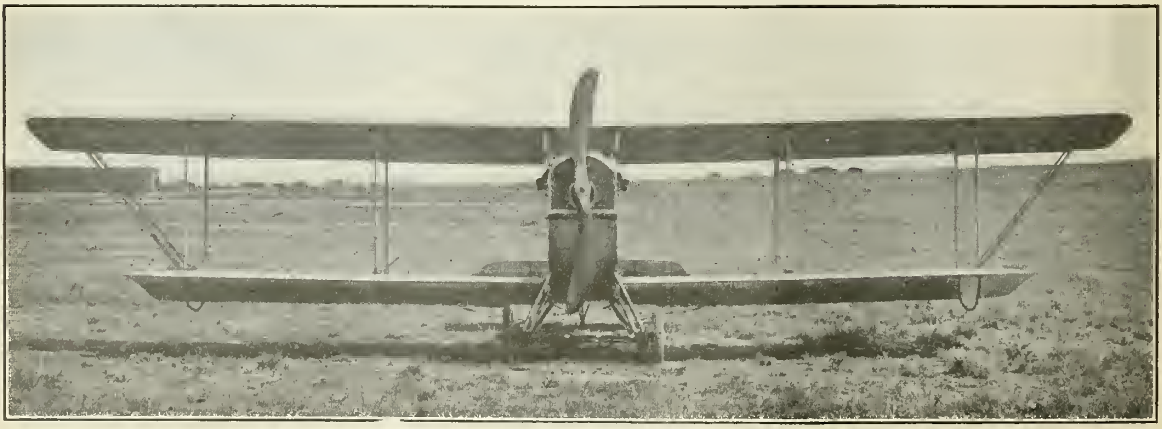
R. A. F. stitching is employed in attaching the fabric to the ribs. To finish four coats of "dope" and two coats of Valspar are used. A factor of safety of 7 is employed. The lift to drift ratio is 12.

Fuselage

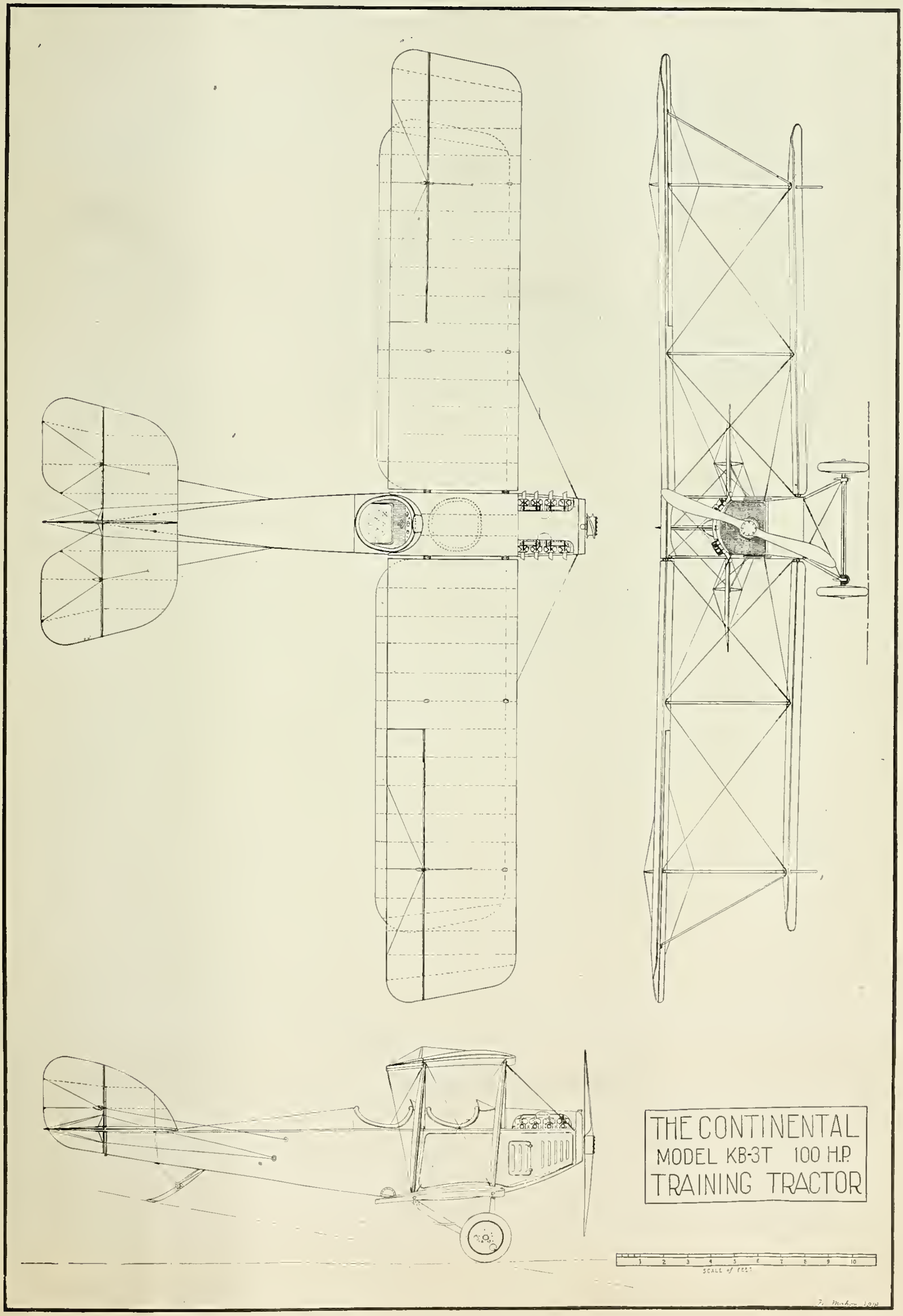
Fuselage longerons are made of ash in forward part and spruce in the rear and are 1½ x 1¼″. The engine section and to a point behind the passenger seat is covered with 18 gauge aluminum. This has doors for easy inspection of the gas and oil "shut offs", etc.

Top longerons are 10″ above the line of thrust. Cowling rises to a height of 10″ above the longerons. The engine is mounted on ash beams, with a special steel nose plate in front. The two seats are nicely upholstered and feel comfortable, which should assist in overcoming fatigue. The stick control, which is dual, is very light in weight and weighs, complete, only 17 pounds. A full equipment of instruments are mounted on the dashboard in front of the pilot.

(*Continued on page* 345)



Front view of the Continental Training Tractor



THE CONTINENTAL
MODEL KB-3T 100 H.P.
TRAINING TRACTOR

NAVAL *and* MILITARY AERONAUTICS

Key to Abbreviations

AAD—Assigned to active duty.
ABC—Report to Army Balloon School, Arcadia, Cal.
ADO—Report to Aviation Supply Depot, Dayton, Ohio.
ADT—Report to Aviation Supply Depot, Dallas, Texas.
AFO—Report to Aviation Supply Depot, Fairfield, O.
AGC—Report to Aviation Supply Depot, Garden City, L. I., N. Y.
AHT—Report to Aerial Gunnery School, Houston, Texas.
AIR—Transferred to the Air Service, National Army, without change in rank or date of commission.
ALF—Report to Camp Alfred Vail, Little Silver, N. J.
AMV—Report to Aviation General Supply Depot, Morrison, Va.
AOV—Report to School for Aerial Observers, Hampton, Va.
APR—Report to School of Aerial Photography, Rochester, N. Y.
ARV—Report to Aviation Supply Depot, Richmond, Va.
ASM—Report to Aviation Mechanics' Training School, St. Paul, Minn.
BFT—Report to Barron Field, Fort Worth, Texas.
BRN—Report to Bakers Field, Rochester, N. Y.
BST—Report to Brooks Field, San Antonio, Tex.
CAF—Report to Carlstrom Field, Arcadia, Fla.
CAP—Commissioned as Captain, Aviation Section, Signal Corps.
CDT—Report to Aviation Concentration Camp, Dallas, Texas.
CFT—Report to Carruthers Field, Fort Worth, Texas.
CGC—Report to Aviation Concentration Camp, Garden City, L. I., N. Y.
CGS—Report to Aviation Concentration Camp, Greenville, S. C.
CIT—Report to Radio School, Carnegie Institute of Technology, Pittshurgh, Pa.
CJS—Report to Camp Jackson, Columhia, S. C.
CJW—Report to Camp John Wise, San Antonio, Texas.
CLR—Commissioned as Colonel, Aviation Section, Signal Reserve Corps.
CMV—Report to Aviation Concentration Camp, Morrison, Va.
CPA—Commissioned as Captain Air Service, National Army.
CPR—Commissioned as Captain, Aviation Section, Signal Reserve Corps.
CRI—Report to Chanute Field, Rantoul, Ill.
CSO—Report to the Chief Signal Officer, Washington, D. C.
CUI—Report to School of Military Aeronautics, Cornell University, Ithaca, N. Y.
CWT—Report to Call Field, Wichita Falls, Texas
DAF—Report to Dorr Field, Arcadia, Fla.
DAP—Report to Director of Aircraft Production, Washington, D. C.
DIK—Report to Camp Dick, Dallas, Tex.
DIS—Honorably discharged from service.
DMA—Report to Director of MilitaryAeronautics, Washington, D. C.
ELA—Report to Eherts Field, Loanoke, Ark.
EOT—Report to Ellington Field, Olcott, Texas.
FLA—Commissioned as First Lieutenant Air Service, National Army.
FLR—Commissioned as First Lieutenant, Aviation Section, Signal Reserve Corps.
FLT—Commissioned as First Lieutenant, Aviation Section, Signal Corps.
FOB—Report to Fort Omaha Balloon School, Omaha, Neh.
FRF—On duty requiring regular and frequent aerial flights.
FSO—Report to Fort Sill School for Aerial Observers, Fort Sill, Okla.
GIT—Report to School of Military Aeronautics, Georgia Institute of Technology, Augusta, Ga.
GLC—Report to Gerstner Field, Lake Charles, La.
HHN—Report to Hazelhurst Field, Mineola, L. I., N. Y.
JMA—Rated as Junior Military Aviator.
JRC—Report to Jackson Field, Riverside, Cal.
KST—Report to Kelly Field, So. San Antonio, Tex. (When specified in the order, the number of the field is given in parentheses)
LDT—Report to Love Field, Dallas, Tex.
LHV—Report to Langley Field, Hampton, Va.
MAC—Report to March Field, Allesandro, Cal.
MAJ—Commissioned as Major, Aviation Section, Signal Corps.
MAT—Report to Mather Field, Sacramento, Cal.
MDO—Report to McCook Field, Dayton, Ohio.
MIT—Report to School of Military Aeronautics, Massachusetts Institute of Technology, Boston, Mass.
MJA—Commissioned as Major Air Service, National Army.
MJR—Commissioned as Major, Aviation Section, Signal Reserve Corps.
MSC—Report to Radio School, Maryland State Agricultural College, College Park, Md.
OBS—Attached to the Aeronautical Service as Observers.
OSU—Report to School of Military Aeronautics, Ohio State University, Columhus, Ohio.
PFO—Report to Post Field, Fort Sill, Okla.
PMT—Report to Park Field, Millington, Tenn.
PUP—Report to School of Military Aeronautics, Princeton University, Princeton, N. J.
PWM—Report to Payne Field, West Point, Miss.
REL—Relieved from present duty.
RSD—Report to Rockwell Field, San Diego, Cal.
RTR—Retransferred to organization attached to previous assignment to aviation duty.
RWT—Report to Rich Field, Waco, Tex.
SBI—Report to Scott Field, Belleville, Ill.
SAG—Report to Souther Field, Americus, Ga.
SGS—Report to Camp Sevier, Greenville, S. C
SLA—Commissioned as Second Lieutenant Air Service, National Army.
SLR—Commissioned as Second Lieutenant, Aviation Section, Signal Reserve Corps.
SLT—Commissioned as Second Lieutenant, Aviation Section, Signal Corps.
SMM—Report to Selfridge Field, Mount Clemens, Mich.
SRC—Report to Columhia School for Radio Officers, New York City.
TFT—Report to Taliaferro Field, Fort Worth, Texas. (When specified in the order, the number of the field is given in parentheses)
TMA—Report to Taylor Field, Montgomery, Ala.
UCB—Report to School of Military Aeronautics, University of California, Berkeley, Cal.
UIU—Report to School of Military Aeronautics, University of Illinois, Urhana, Ill.
UTA—Report to School of Military Aeronautics, University of Texas, Austin, Tex.
VBW—Report to Vancouver Barracks, Washington.
WAC—Report to Aviation Concentration Camp, Waco, Tex.
WCS—Wire to the Chief Signal Officer upon arrival.
WDM—Wire, Director of Military Aeronautics, upon arrival.
WFO—Report to Wilhur Wright Field, Fairfield, Ohio.

Notes

Note 1—Report to places mentioned in order named for temporary duty.

Note 2—Report to Chief Technical Section, Dayton, Ohio.

Note 3—Report to Prod. Eng. Dept., Dayton, O.

Note 4—Report to Dis. Mgr. A. P., Dayton, O.

Note 5—Report to Students Army Training Corps, Univ. N. C., Chapel Hill, N. C.

Note 6—Report to Students Army Training Corps, Univ. Mich, Ann Arhor, Mich.

Note 7—Report to Students Army Training Corps, Univ. Wisconsin, Madison, Wis.

Note 8—Report to Students Army Training Corps, Defiance College, Defiance, Ohio.

Note 9—Report to Aviation Gen. Supply Depot, Middletown, Pa.

Note 10—Report to American Wood Reduction Co., Kingsport, Tenn.

Note 11—Report to Dis. Mgr. production, 480 Lexington Ave., New York City.

Note 12—Report to Aviation Officer, 90 West Street, New York City.

Note 13—Report to Acceptance Park, Western Ave., Springwells, Detroit, Mich.

Note 14—Report to West Va. Pulp and Paper Co., Mechanicsville, New York.

Note 15—Take command at Aircraft Prod. Depot, San Francisco, Cal.

Note 16—Report to Aviation Depot, No. 1, 422 W. 15th St., New York City.

Note 17—Report to Southern Dept., Fort Sam Houston, Tex.

Note 18—Report to Tenn. Valley Iron and Railway Co., Collinwood, Tenn.

Note 19—Take command at Aircraft Prod. Depot, Los Angeles, Cal.

Special Orders Nos. 222 to 227, Inclusive

A

Andrews, Howard M	EOT
Akin, Thomas B	PWM
Armstrong, Max V	TFT
Allen, Morton P	PWM
Ashley, Thomas Woodhury	SLA: CWT
Allen, Charles Madison	EOT
Adams, Harold V	PWM
Atwell, William B	PWM
Auhke, Carmon Joseph	SLA: PMT
Abels, Charles A	CJW
Annin, Joseph P	CUI: LHV: Note 1
Ailsworth, Richard E	LHV
Adler, Elmer Edward	CPA
Austin, William J	CGC
Ayling, John Gray	CPA
Adams, James S	LHV
Ashhy, William T	TFT
Archer, Morris	MJA
Anderson, Leland S	RSD
Aurelius, Paul J	RSD
Agar, William M	Note 2

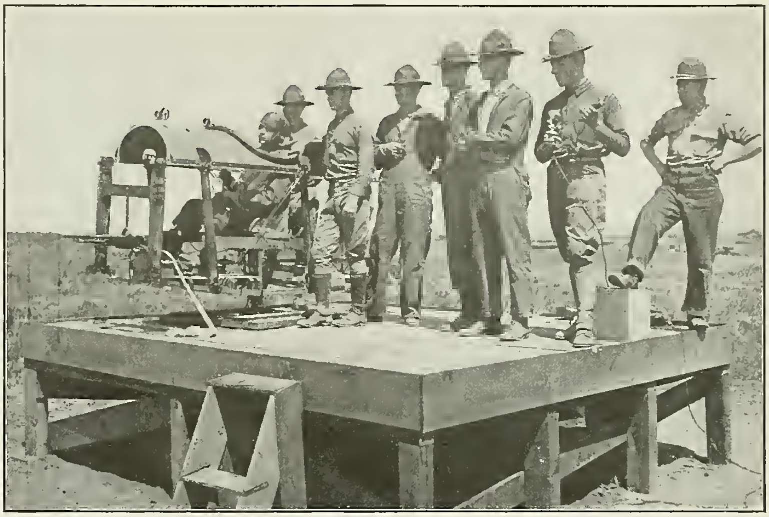
B

Barnes, Herbert T	PWM
Barnes, Gerald K	CJW
Brooks, John H	CJW
Burhank, Wayne	CJW
Broderick, William J	CGC
Braun, Milton F	TFT
Bush, Bradford S	PWM
Burnett, Robert	HHN
Biles, Kenneth Oscar	SLA: EOT
Botts, Robert T	EOT
Burke, Walter C	CWT
Beaven, Joseph C	LHV
Brandt, Alvin R	TFT
Butterworth, Russell I	GLC
Bartlett, Charles O	GLC
Bruner, William D	JLA: AAD
Boyce, Charles W	CUI
Bourman, Charles A	TFT
Bailey, Augustus O	PWM
Bickford, George F	PWM
Bonnell, Harry M	PWM
Brenneke, Augustus M	CGC
Bowers, Eugene	SRC
Breese, Winfield S	CGC
Barnard, William B	CJW
Braman, Arthur H	PWM
Blanchard, Henry McCoy	SLA; EOT
Bower, Claire A	CGC
Beck, Thomas E	CWT
Bailey, Henry F	CGC
Brainerd, Walter M	CGC
Barrett, Arthur E	CGC
Berkowitz, Ben	CGC
Bone, Norfleet G	CGC
Bartlett, Lowell W	PWM
Billiter, Earl D	PWM
Brown, John J	PWM
Burns, Kenneth	PWM
Baker, Lee A	CGC
Bible, Dana X	CGC
Bowden, William M	CGC
Burger, Fairfax C	PWM
Buswell Walter S	PWM
Baxter, Marcus L	EOT
Boerner, Eugene S	EOT
Boushall, Joseph D., Jr	EOT
Buffum, Frederick C., Jr	CGC

Bailey, Carlton Lasater	SLA; UTA
Bagley, Frank H	PWM
Burkhart, Harry L	PWM
Beale, Allen S	PWM
Bennett, John J., Jr	KST
Brown, Sewall	RSD
Burke, Walter Clinton	SLA; TMA
Brown, Oscar	CPA
Burnam, Samuel Parkes	CPA
Bagby, Howard	CGC
Beaven, Joseph C	CGC
Budd, Ogden D., Jr	CAF
Brooks, Ivan Homer	SLA; CWT
Brooks, John Henry	SLA; ABC
Bloomer, Asa S	CJW
Bishop, James Gillespie	SLA: CWT
Brissell, Willard S	CGC
Boxell, Earl F	CGC
Bamberger, Raymond S	DMA
Byrnes, James E	CGC
Booth, John Valvin	SLA; GLC
Bishop, James G	RSD
Burleigh, Donald M	CJW
Bradley, Francis M	RSD
Beecher, John F	KST
Boswick, John S	LHV
Brown, Harry G	LHV
Baldwin, Henry M	PWM
Booth, Lyman	TFT
Billman, Elliott	CGC
Brenton, Walter	CGC
Booth, Morrison	CJW
Bennett, Frank P	LHV
Brennan, Edward W	LHV
Babcock, Edward Denison	FLA
Bigelow, Joseph S., Jr	FLA
Birmingham, Hugh J	CJW
Bates, Lesley R	CGC
Barrett, William J	CGC
Buser, Albert E	CGC
Best, Harvey G	CGC
Brock, William A	CGC
Breckon, Leslie S	CGC
Blodgett, Charles L	CJW
Becker, William Richard	CPA
Bryan, William Harper	CPA
Black, Alexander	FLA
Bornefield, Harold Tansley	FLA
Brew, George J	FRF
Bronson, Tyler C	FRF
Beauchamp, John H	ADT
Bowles, Walter S	GLC
Burrage, Albert C	Note 4
Bartels, Edward Frederick	SLA; Note 10
Blood, Frank L	Note 16
Bolton, Edward D	Note 6
Bagley, Harvey B	Note 15
Bowler, Lawrence R	Note 3
Bailey, James Ruskin	FLA
Blockinger, Carl H	Note 6

C

Chetlain, Frederick H	PWM
Cooper, George W	PWM
Craig, Alexander, Jr	WFO
Cory, Wayne M	GLC
Cecil, Eugene	CGC
Choate, George F	CGC
Crisp, Marshall C	CGC
Crossan, Carroll B	CGC
Corkville, John D	PWM
Caulkins, Ralph M	EOT
Canfield, Donald T	GLC
Carpell, Otto C	PWM
Chamberlain, Clarence D	PWM
Coffee, John A	PWM
Coles, Norman E	CWT
Critz, Robert, Jr	CGC
Crawford, Robert H	CGC
Cochran, Edward R	CWT
Chidlaw, Carol H	EOT
Cundiff, Lawrence B	LHV
Cheese, Charles B	EOT
Cole, James B	CFT
Clarke, Edmund M	CFT
Caldwell, Philip Lord	CPA
Christopher, Gerald A	FLA: ELA
Carr, Harold Hibbard	SLA: SAG
Clancy, Edwin M	KST
Cousins, Ralph P	HHN
Clark, Walter D	PWM
Carter, Edward V	CGC
Cavagnaro, James F	CGC
Clark, Bruce	EOT
Cooper, Edward I	EOT
Coesfeld, Henry M	CJW
Cook, Philip P	LHV
Callender, Marshall C	CAF
Callahan, Samuel M	CGC
Carples, Bernard J. R	CGC
Coles, Barry F	CGC
Crawford, William Lee	EOT
Crabtree, Lloyd W	CGC
Chatterson, Marshall C	TFT
Cochrane, Robert M	TFT
Clark, George Lawson	SLA; LDT
Clark, McKinley F	CGC
Christensen, Ezra A	PWM
Conway, Joseph C	PWM
Calkins, Richard W	PWM
Cook, Dean C	PWM
Carmine, John W. S	CGC
Caldwell, Frederick W	CGC
Christian, Savias T	CJW
Coffman, Lionel A	CGC
Carlson, Arthur G	CGC
Clawson, Harry O	CGC

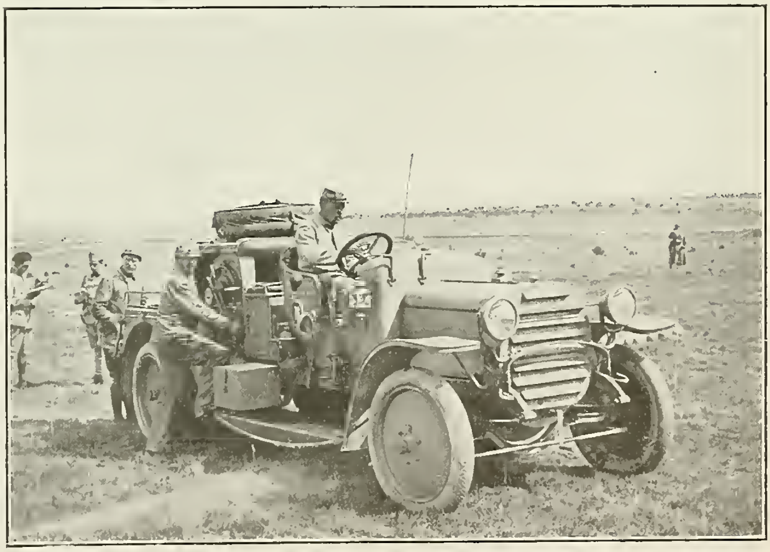


Training our aerial gunners at the School of Aerial Gunnery at North Island, Cal. The student is seated in an aeroplane cockpit. The whole fuselage sways at his slightest movement. He is here shown firing at a moving target. The machine gun is shown at his feet

Claghorn, James L	GLC
Curtiss, Frederick W., Jr	GLC
Carpenter, Russell Hand	CPA
Christy, Lee Albert	CPA
Christie, James Arthur	CPA
Carey, Allan J	CGC
Clark, Ernest	CPA
Cumpston, Edward Henry, Jr	CPA
Carlton, Henry F	CGC
Chittenden, Gerald	MJA
Grassweller, Frank H	SRC
Cadien, Lee	SLA; Note 14
Carples, Edmund L	Note 8
Cappe, Benjamin H	Note 6
Clifford, Albert G	Note 6
Croen, Herman F	Note 9
Comstock, Asa H	Note 9
Carey, Homer F	CGC

D

Dorner, Earle V	CGC
Duke, Jack E	LDT
Deadman, William W	PWM
Donaldson, Howard Logan	SLA; EOT
Dezendorf, Edward H	SLA; FOB
Dawson, John C., Jr	CGC
Dickinson, Roy W	CGC
Duffield, John	EOT
Dawson, Earle R	EOT
Drake, Albert B	EOT
Dennis, Fred Condon	SLA; EOT
Dreby, Ernest E	PWM
Dunford, Samuel W	PWM
Dailey, Harry A	UIU
Duthie, Robert D	PWM
Dean, Alexander	LHV
Davis, Clarence A	CGC
Demarest, William C	PWM
Donaldson, Harold Ruddell	SLA; KST
Downes, Philip H	PWM
Dujardin, Harold E	PWM
Doherty, George J	PWM
Dickinson, Clarence R	HHN
Datson, Edmond Charles	SLA; DAP
Druffner, Karl M	TFT
Dupuy, Thomas F	UTA
Devanny, Earl Hannum	SLA: ELA
Day, Robert F	LHV
Dunstan, Fred L	CGC
Davey, Everett K	CFT
Dwindell, Ralph M	CGC
Devlin, George M	EOT
Dimmick, Harold E	CAF
Dillaway, Mansen M	CGC
Devereaux, Walter B	MJA
Doty, Merle B	CGC
Dean, William Johnson	CPA
De Forrest, John	CPA
Dixon, Richard Hooper, Jr	CPA
Davidson, Frank Gaines	CPA
Dixon, Thomas Danforth	CPA
Dresser, Burt's E	SLA
Davis, Arthur O	PWM



A French observation balloon winch mounted on a motor lorry. In this way the balloon, after ascent, can be towed considerably nearer the front than is possible otherwise. A balloon under fire in the air can also be shifted quickly this way

American aviators training for contact patrol on infantry liason work, somewhere in France

Darflinger, Lambert	SRC
Diehl, Norval E	RSD
Davies, Isaiah	CPA
Dorr, Philip J	Note 9
Dyke, Curtis E	Note 9
Dunne, Vincent L	Note 7

E

Edwards, J. Paulding	DMA
Elliott, Park	GLC
Evans, John M	CUI
Easterling, Anthony M	TFT
Ewing, Walter L	WFO
Ehrlichman, Rudolph E	PWM
Eilenherger, John T	PWM
Eichelberger, Raymond T	CGC
Eskind, Ernest	CPA
Earle, Ralph	FLA
Eggleston, Herhert C	LHV
Eastman, Andrew J	TFT
Eglin, Frederick L	CPA
Elliott, John William	CPA

F

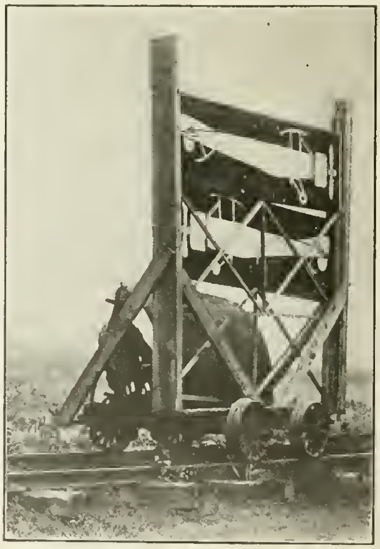
Fuller, Harlow M	WFO
Foster, Robert H	WFO
Frere, Henry B	EOT
Flourney, William R	CGC
Foster, Edwin B	PWM
Fitzpatrick, Arthur	CWT
Fuller, James E	CWT
Frewer, John W	LHV
Fleming, Donald L	CWT
Foster, Ralph F	PWM
Feltuherger, Ralph D	CWT
Fernald, James G	CGC
Farquhar, Guy L	EOT
Fisher, Ewing B	LHV
Fiske, Charles H., Jr	FLA
Fort, Edwin H	FLA
Farrar, Delwin B	CGC
Farnham, Charles Van Orden	SLA; GLC
Foster, Raymond W	CGC
Fournier, Paul	SMM
Feick, William	PWM
Foxon, Roy D	PWM
Freedard, William	SLA; ABC
Field, William B. Osgood	CPA
Fleming, Carl	PWM
Frank, Philip R	CJW
French, John Taylor	SLA; Note 11

G

Gaylord, Paul C	PWM
Gallup, Floyd H	CWT
Gearish, Charles A	CJW
Gardner, Keisey B	LHV
Glenn, Earl F	TFT
Griffith, Frank L	CGC
Gahman, Floyd	CGC
Gordon, George L	UBC
Gillespie, Eugene F	PWM
Gibbons, Francis C	CWT
Ganey, Daniel F., Jr	PWM
Grayson, Forrest	CGC
Graham, Charles F	PWM
Greene, George G	CWT
Gardner, Kelsey B	CGC
Gardner, J. Francis	PWM
Greene, Tom W	PWM
Griffith, John, Jr	PWM
Gihson, Frank H	PWM
Grevenherg, Marion E	PWM
Greenman, Fred W	CGC
Guild, Paul C	CGC
Guyton, Roy Altamont	SLA; ELA
Glover, James Edward	SLA; KST
Gray, Willard E	TFT
Goodwin, William	SLA; RSD
Guerin, Samuel Vincent	SLA; ABS
Goddard, George W., Jr	TFT
Galentine, Norman E., Jr	CJW
Goldblatt, Benni	CPA
Gillein, Maurice F	CJW
Guyton, Roy A	CWT
Goldherg, Louis	PWM
Garretson, William V	TFT
Graham, Harry	MJA
Guest, David Porter	PWM
Grimm, Alfred	CPA
Gordon, Myron B	Note 2

H

Hoffman, Jacob V	WFO
Hyman, Walter R	WFO
Hellenherg, Frederick W	DMA; CUI; Note 1
Haigh, Henry W	PWM
Hoover, Chester A	PWM
Hunt, Burton L	GLC
Hartman, Harry B	CGC
Humphrey, Arthur Field	FLA
Heffner, Roy J	SRC
Hutchins, William J. M	FLA; CSO
Harding, Ray W	CJW
Huntington, Ralph O	CGC
Howard, Ernest F	TFT
Hendrickson, Elmer Ludgwig	SLA; DAP



Aerial gunnery at Taliaferro Field, Texas. Silhouettes of aeroplanes are moved across the range on a hand truck. The operator of the truck is protected by steel plates

Holnes, John W	TFT
Hannum, George H	DMA
Hearne, George M., Jr.	PWM
Hulbert, Lucius G	PWM
Halle, Simon	GLC
Hammond, Fred R	TFT
Huffman, Charles R	GLC
Holmes, James E	CGC
Higbee, Walter F	UBC
Haynes, Richard O	PWM
Horrigan, Thomas F	PWM
Hubbard, George G	HHN
House, William R	CGC
Haughawaut, John F	CJW
Hazeltine, Richard G	CGC
Hawks, Horace G	CGC
Hovey, Willard Porter	SLA; BST
Holway, Lowell H	FWM
Hunter, John A	CGC
Heller, Myron	KST
Haslam, Reed H	PWM
Haylor, John R	PWM
Hamill, Howard E	PWM
Hefron, Bernard M	PWM
Holt, Harry C	PWM
Harris, Hurshel Irwin	SLA; GLC
Hayes, Martin Joseph	SLA; SAG
Haynes, Roy Mason	SLA; SAG
Harrison, Mitchell	APR
Higgins, George Judson	FLA; HHN
Hewes, Harry	DAP
Hoare, J. Maurice	PWM
Henderson, Rema J	WFO
Hobbs, John E	PWM
Harding, Paul C	CJW
Hine, Harold Morton	SLA; FOB
Harwood, Robert W	PMT
Hodgdon, Melvin W	SLA; DMA
Harper, Waitland C	LHV
Harter, Earl C	LHV
Hayes, Charles L	TFT
Hoyt, William K	EOT
Hansell, Don M	RSD
Hennessey, James R	RSD
Hunter, Daniel F	RSD
Houlton, Raymond C	LHV
Hooper, Arthur U	CGC
Heine, Henry W	GLC
Hussey, Clyde L	SLA
Hampton, Stanlee R	RSD
Hendricks, Adolph	CUI
Hickman, Cecil R	CGC
Horton, Russell B	CGC
Houston, Sam	SRC
Heller, William B	Note 13
Holmes, Wayne M	Note 2
Hoddick, Alvin C	Note 9

I

Irwin, Charles L	CJW

J

Jenkins, Paul Walton	SLA; DAP
Junkins, Albert B	GLC
Jackson, Samuel D	CWT
Jaques, Gordon Fravel	FLA
Johnson, Frederick Charles	FLA
Jordan, Herhert Wilson	SLA; KST
Jones, Clifford E	CGC
Johnson, Elmo Grover	FLA
Jordan, James Bumer	SLA; FOB
James, Roy P	LHV
Jarmuth, Douglas	CGC
Joyes, Morton V	Note 19
Joy, Henry M	Note 2

An American Aero Squadron in France **(French Official Photo)**

K

Kirk, Harris C	PWM
Krieger, Robert J	PWM
Kerin, Anthony J	GLC
Kunkel, Fred E	SLA; DMA
Kramer, Emanual	PWM
Kern, John T	PWM
Knickerbocker, Harry C	PWM
Kinberg, William O	DMA
Krug, Frank W	PWM
Kelly, John L., Jr	UIU
Koenig, Theodore J	UIU
Knoche, Frederick E	CGC
King, Ivan R	LHV
Kron, Elias H	DMA
Kiesewetter, Edward W	CGC
Kahl, Charles A	CRI
Kayser, Allan J	TMA
King, William T., Jr	CGC
Kirksley, Guy	PMT
Keily, Thomas Leo	SLA; CRI
Kelly, Bernard E	CGC
Kurtz, John W	CJW
Knight, Louis R	MJA
Kreger, Henrly L. F	PWM
Keller, Clarence K	CGC
Keefe, Robert J	CPA
Keenan, Walter M	CPA
Kolloch, William Gregg	CPA
Keeler, Horace B	CJW
Knight, Lloyd W	CJW
Kaynor, Warren Fox	CPA
Kelley, Joseph J	PWM
Kinnear, James S	RSD
Kerr, Robert W	RSD
Kinne, Harold O	RSD
Kinnear, Lawrence W	PWM
Kerr, Spencer H	Note 2

L

Lowe, Robert E	GLC
Lederer, Lewis G	CUI; LHV; Note 1
Lenkerking, Louis T	PWM
Looram, Lucian A	PWM
Lintz, Roy P	PWM
Lohman, Sylvester M	PWM
Leighninger, Robert E. H	CGC
Linnan, Luke E	PWM
Levy, Edward J	RSD
Lloyde, Robert K	ABC
Lowstuter, Edward T	CGC
Lea, Curry	CGC
Langmead, Harry W	TFT
Lytle, Lory R	TFT
Long, Bartlett G	CJW
Lavethal, Ruby	CGC
Lowry, Edward B	CGC
Leonard, Edgar W	CGC
Lewis, William	KST
Leonard, Leonard Rich	SLA; KST
Leitner, Clarence W	PWM
LeRoy, Philip Newbold	FLA; CRI
Lanfall, John Tollefson	FLA
LeBoutillier, Sidney Pierre	FLA
Longood, Eugene A	CFT
Lockhart, Frank	TFT
Lydiard, Maynard Frothingham	SLA; FOB
Larkin, George R	CGC
Lachmund, Harry G	CGC

M

Mennines, Michael	WFO
Maloy, John S	CWT
Maher, Raymond J	CWT
Myerscough, Joseph M	BFT
Milburn, Eugene Bliss	FLA; DAP
Morrissey, Merle F	TFT
Mason, Edward J	PWM
Morrison, William Robert	FLA
Miller, Max B	PWM
Moore, Samuel M., Jr	DMA
Mosier, Orton Boyd	SLA; VBW
Moynihan, Frederick M	PWM
Markley, John W	CGC
Mercer, Robert A	PWM
Murphey, Harvey W	LDT
Miller, Charles Winfred	SLA; EOT
Mezger, William W	CWT
Marshall, John H., Jr	PWM
Mayer, Herbert C	PWM
Myers, Ray G	CGC
Mowry, Lewis D	Note 7
Murphy, Gerald C	CGC
Magoffin, Paul P	WFO
Miller, Frank M	CGC
Murphy, Harry C	CGC
Marshall, Fred L	CGC
Mathews, Herbert S	CGC
Miskell, James B	CGC
Moninger, Arthur Van Kirk	CPA
Murphy, William Herbert	CGC
Molter, Bennett A	Note 2
Morrison, John Miles	PWM
Massey, Ivor	CGC
Metcalf, William H	CGC
Morrissey, John F	CGC
Martin, Thomas Russell	RSD
Munz, Hugh E	RSD
Meredith, Russell Luff	CPA
Maher, Raymond Jerome	SLA; TMA
Munchbof, Theodore J	FRF
Myers, George I	LHV
Myers, Devereaux Maitland	FFA
Mahannah, Alva E	TFT
Morgan, William T., Jr	TFT
Madden, Edward C	RSD
Mason, Stephen S	CUI
Montgomery, Robert C	PWM
Mozley, Warren M	PWM
Moore, Walter McHenry	LHV
Myers, Clarence G	CGC

Lieut. Henry W. Hoyt, U. S. N., veteran kite balloonist, who has been spotting U-boats from his "sausage". It will be recalled that he had one of the narrowest escapes when his balloon was caught in a gale

M

Maywald, Frederick	PWM
Metzer, Carlisle L	CGC
Meng, Walter J	PWM
Marsh, Ian D	CFT
Meservey, Elmer R	CJW
Mills, Herbert H	CJW
Mason, Shirley L	TFT
Mabry, Palmer V	TFT
Monteith, Darrell M	CGC
Manning, Robert	CJW
Moody, Marvin J	PMT

Mc

McCaulley, Edgar L	DAP
McCue, John B	TFT
McCuistion, Edward T	CGC
McGovern, Edward T	CGC
McLean, Norman Reynolds	PWM
McAllister, Tbomas E	PWM
McKee, Stuart	SLA; EOT
McCarty, Eugene Richard	SLA; Note 18
McCormack, Victor A	KST
MacLure, Henry Goldsborough	FLA
McCall, Lewis Livingston	SLA; PMT
McDermott, Cleveland W	FRF
McRoberts, Horace E	RSD
McMullen, William H	GLC
McCarty, Carl Daniel	SLA; ABC
MacCalla, John D	Note 6
McMillin, Gail Hamilton	PWM
McCoy, Peter J	CPA
McSaughey, Harold S	PWM
McLaughlin, Oscar F	FLA
MacKeeby, Paul Herbert	FLA
McInerney, John	CPA
McDaniel, Vancy C	CJW
MacKenzie, William J	CGC

N

Newman, Samuel H	CGC
Newberry, Hawley D	CGC
Neber, Lawrence W	CGC
Nelson, Francis O	PWM
Nichols, Joseph F	LDT
Nolker, Herman W	CJW
Neet, Lewis, E	CGC
Netcher, Charles	DMA
Nighman, Clare Edwin	FLA; DAP
Newcomb, Paul H	TFT
Nunemacher, Francis E	LHV
Nienhauser, Ralph P	CGC
Neville, Ralph M	CJW
Nicely, George M	LHV

THE THEORETICAL BASIS OF MODEL STRENGTH TESTS FOR AEROPLANE STRUCTURES

By W. L. COWLEY, A.R.C.Sc., D.I.C., Wh.Sc., and H. Levy, M.A., B.Sc., F.R.S.E.

Members of the Scientific Staff of National Physical Laboratory

THE importance of an accurate knowledge of stresses brought into being upon an aeroplane under various conditions of flight cannot be overestimated, in view of the manœuvres that the present war machine must be able to execute with safety. The analytical treatment of this question of stresses in aeroplane structures is unfortunately extremely complicated, both on account of our present lack of mathematical knowledge, and of the imperfectly known factors affecting the strength. It justifiable and at the same time sufficiently simplifying assumptions could be made, we might proceed with considerable rapidity to a solution, but unfortunately it is only as a result of careful experimental work that valid assumptions of this nature could be furnished.

As a simplification of the question, it is generally assumed in practice, that the problem of the strength of the various parts of an aeroplane structure is self-contained and independent of the existence of neighboring parts. An attempt for example is made to treat the wing system as an isolated structure, or the body and fuselage, the tail system or the undercarriage. But it cannot be supposed that this assumption even if it should as it generally does not lead to a complete mathematical solution is in any sense satisfactory, for it is clear that the mere fact that in the complete aeroplane these parts are not isolated involves an end condition, in general indeterminate, to be applied to the isolated portion. For example, the problem of the strength of a fuselage under the torsional effect of the force on the rudder might admit of an approximate solution even if the redundancies which occur were known, provided the effect of the body upon it in the region of juncture could be assumed. This itself would obviously depend upon the degree of rigidity of the framework in the neighborhood of the gap struts, and it would thus appear that the isolation of a particular part, and its treatment by rigorous mathematical methods is at most a very rough approximation to the true problem. Even in those cases where this isolation may be affected with any degree of justification, as for example, in the case of the wings, a still further simplifying assumption requires to be introduced to reduce the remaining complications. In the case referred to, it is customary to treat the effects of the normal and of the longitudinal forces on the wings separately, on the assumption that the effects can be added algebraically. Whether or not this method of treatment is legitimate can only be determined by experiment, but at any rate, it is already recognized that in the case of a staggered biplane the results are far from the truth, and intelligent designers are compelled to face the question whether the gain in aerodynamic efficiency derived from the stagger is not counterbalanced by the uncertainty of the conclusions from stress calculations. Frequently it has happened, in fact, that unknown factors for which allowance could not be made, because of our ignorance of their magnitude, have been such as to reverse completely, the conclusions as regards strength. For example, wing structures which on calculation have indicated weakness have been found on final trial to furnish a much better performance than that anticipated, on account of the effect of such unknown factors as the fabric, ribs, etc. Although in this case the errors have occurred on the safe side they are just as likely to be on the other side, and involve weakness. A continuance of the present method of blind groping is clearly wasteful and futile.

It appears, then, that the failure of analysis to treat this problem in any satisfactory manner demands the pursuit of some line of experimental investigation for confirmation of the analysis at least, if not for more direct and positive research into the question. If the basis for such experimental work could be securely laid, it would be possible to produce results both of empirical value and of the nature of the simplifying assumptions required for the mathematical treatment. To some extent the ground has already been broken on this question by tests to destruction on full scale machines. The part to be tested is loaded with sand bags according to distributions previously determined, until collapse occurs. Apart from the expense and cumbersome nature of this test it is clear that serious limitations are imposed upon its application to determine the effects of apparently unimportant parts, and various degrees of comlexity of loading. No such experimental difficulties arise, however, if it should he possible to conduct the test upon a model, under which circumstances complete command can normally be obtained over the experimental conditions.

If the basis of the methods of transition from results on model tests, to full scale, could once be made secure it is evident that an immense advance could be made and tests executed with rapidity, thoroughness and relative cheapness. This point scarcely requires emphasis.

It is proposed to show that the theoretical basis of the whole method may be developed in quite a rigorous yet simple manner by an application of the principle of homogeneity of dimensions to the type of problem under discussion.

When a homogeneous prismatic strut of length l pin-jointed at the ends is subjected to axial end thrusts, then up to a load given by

$$F = \pi^2 \frac{E I}{l^2}$$

the undeflected position is one of stable equilibrium provided the ultimate stress is not exceeded. Beyond this so-called Euler's critical load, the straight position is one of unstable equilibrium. If the strut be deflected, as long as the load is maintained the axis will continually undergo change in shape until it ultimately takes up a form of elastica. During this process the yield point of the material of which the structure is composed may be exceeded and the material may rupture. The strut may thus he supposed to fail for two possible reasons, on the one hand hecause its shape has heen permanently changed from the straight normal position owing to the instability of that position, and on the other hand because the actual material has failed to withstand the stresses originated. This conception is of course not limited to such a simple structure as a strut, for it may he seen that in general a framework of any kind may fail for either of these two reasons. In the first place, the geometrical configuration may be such that when the structure is subjected to a particular type of loading a small disturbance may involve a continuous change in shape until a finite deviation or deflection is produced. This presupposes that the geometrical shape is considered maintained as long as alterations in outline are at most of the same order as those of the disturbance, assumed small. In the second place, irrespective of any alteration in the geometrical shape of the structure, if the stresses brought into being immediately subsequent to the loading are as great as or greater than the ultimate stress the material can sustain so that the yield point is reached, the structure will collapse by direct rupture of the weakest member. Even if no external loading be applied, but the structure is under forces due only to its own weight—in a sense, of course, external loading—it can be shown that a limit exists to the dimensions of a geometrically similar structure made of the same material, so that if this limit be exceeded stresses will be called into existence so great as to involve rupture. It is proposed to investigate what information may be furnished regarding these two types of failure, rupture and instability, by an application of the dynamical laws through the medium of the dimensional theory.

Consider the case of a structure of the type of an aeroplane framework, for example, where it is supposed that the assumptions made in the ordinary beam theory apply to every part. Let the length of one part, say a bay, be given by l, the area of a particular section by A, moment of inertia I, and the elasticity and density of the material of which it is composed E and ρ, respectively. Given these quantities for this one portion, it will be assumed that the shape and geometry of the structure involve an exact specification of how to derive the corresponding quantities for the remaining portions. Let the external load be F, applied in some given manner specified by the geometry, and suppose this is sufficient to produce a stress just greater than the yield stress f in the material of the weakest member. F can only depend apart from the geometry and manner of application upon the quantities enumerated above, defining the properties of the material. These are as follows:

Physical quantity.	Symbol.	Dimensions.
Young's Modulus..........	E	M/LT^2
Area	A	L^2
Moment of Inertia.........	I	L^4
Length	l	L
Density	ρ	M/L^3
Yielding stress............	f	M/LT^2
Gravity	g	L/T^2
Load	F	ML/T^2

Since F, the load which will cause collapse by rupture of the material, must involve all these quantities grouped together in such a manner as to make the dimensions of the product identical with those of F, we may write

$$F \propto E^x A^y I^z l^p \rho^q f^r g^s.$$

The dimensions of this are clearly

$$M^{x+q+r} L^{-x+2y+4z+p-3q-r+s} T^{-2x-2r-2s} = \frac{M L}{T^2}$$

Equating powers of M, L, and T.

$$x + q + r = 1.$$

$$-x + 2y + 4z + p - 3q - r + s = 1,$$

$$x + r + s = 1,$$

$$\therefore F \propto E l^2 \left(\frac{f}{E}\right)^r \left(\frac{A}{l^2}\right)^y \left(\frac{g l \rho}{E}\right)^s \left(\frac{I}{l^4}\right)^z.$$

It will be more convenient to write this in the form

$$F \propto \frac{E I}{l^2} \left(\frac{f}{E}\right)^{r+s} \left(\frac{A}{l^2}\right)^{y-s} \left(\frac{W}{f A}\right)^s \left(\frac{I}{l^4}\right)^{z-1},$$

where instead of $g l^3 \rho$ its equivalent W, the weight of the portion of the structure considered, is taken.

It is evident that every term in the expression for F must take the form given above, but so far no restriction has been imposed on the values of the quantities r, s, y and z. Under these conditions F could be represented as the sum of a series of terms in which f/E, A/l^2, $W/f A$, I/l^4 could appear to any power whatsoever, but in each such term EI/l^2 would be a factor. This is equivalent to the statement that

$$F = \frac{E I}{l^2} \psi \left(\frac{f}{E}, \frac{A}{l^2}, \frac{W}{f A}, \frac{I}{l^4}\right)$$

where ψ for the moment is an arbitrary function. Writing

$$\phi^2 = F l^2 / E I \quad . \quad . \quad . \quad . \quad (1)$$

so that this quantity may be considered as a non-dimensional critical loading coefficient, it follows finally that

$$\phi^2 = \psi \left(\frac{f}{E}, \frac{A}{l^2}, \frac{W}{f A}, \frac{I}{l^4}\right) \quad . \quad . \quad . \quad . \quad (2)$$

It is clear from the definition of ϕ, that for a given structure where l, E, and I are known ϕ is uniquely determinedwhen F, the breaking load is found, so that the discussion of collapse by rupture may equally well be centred round ϕ. Let it be clearly understood that the exact form of the function ψ in (2) depends only on the geometry of the structure, including the manner of loading and the law of distribution of material.

Similarity of Structures.—Out of the general class of framework embraced in this discussion so far let there be selected a series of which all members are identical with respect to external shape, differing only in magnitude. This implies that A the area of cross section of any selected part is proportional to l^2 and I to l^4. For this series, therefore, A / l^2 and I / l^4 are constants depending only on the geometry, and accordingly expression (2) now takes the simplified form

$$\phi^2 = \psi_1 \left(\frac{f}{E}, \frac{W}{f A}\right) \quad . \quad . \quad . \quad . \quad . \quad (3)$$

It is not difficult to give an interpretation to the two non-dimensional qualities f / E and $W / f A$. The former being the ratio of the yielding stress to Young's modulus may be taken as the strain at the yield point, on the assumption that Hooke's Law applies rigorously over the whole range. In the same way, $W / f A$ is the ratio of the weight of a particular member, say the weakest, to the maximum tensile or compressive force, as the case may be, which that member is capable of withstanding without yielding assuming that the section A is taken at the position of collapse.

As far as a discussion of the breaking load co-efficient ϕ^2 is concerned, it is evident that if a series of geometrically similar structures be selected two distinct variables, and two only, functions of the material affect the question. These are the strain at the yield point for the weakest member, the ratio of the weight of that member to the maximum tensile or compressive force it can withstand at the point of yield. It is equally clear, however, that the so-called geometrical restrictions determining the distribution of the constants of the materials in a composite structure are not absolutely vital to the above discussion, so that violations of the laws determining the selection of the material from member to member would not necessarily vitiate the conclusions arrived at here. For example, one would not be rigorously entitled to vary I, A and E in certain members, since such a change would clearly upset the geometrical similarity of shape and the distribution of force with the possible result that the previously weakest member might now not remain such. No such trouble, however, could arise if the selection of the materials was made without changing these factors, but allowing a variation in f the yielding stress so long as the previously weakest member always remains so in the series. This is equivalent to an increased latitude in the scope of selection of material.

Generally in experimenting with a model of this nature it is convenient, of course, to have corresponding parts in the model and the full-scale structure composed of identical materials. If for example, the frame of an aeroplane were under discussion, wires in the model would be composed of the same metal as those in the original, corresponding struts, spars, ribs, &c., of the same wood.

Since the quantities f, E l, ρ, &c., in the expression for ϕ^2 all refer ultimately to the same part of the model, to ensure geometrical similarity in the widest sense it follows that the assumption that f / E is a constant is one which is obvious experimentally. Under these circumstances also $W / f A$, as can easily be verified becomes proportional to the linear dimension l. The breaking load co-efficient ϕ^2, therefore, when the weight of the structure contributes towards rupture is purely a function of l,

$$\phi^2 = \phi_1 (l),$$

and the form of the function is determined only by the shape of the various parts, the geometry of the loading and the so-called geometry of the material.

This expression for ϕ^2 may likewise be supposed solved for l in terms of ϕ. For every external load coefficient this equation then determines the size of the structure corresponding to failure. When there is no external load and failure is due to weight alone $\phi = 0$ and the result previously anticipated is seen to hold.

Structures of Negligible Weight.—When the material is not sufficiently heavy to involve the weight of the structure appreciably as a factor in causing collapse the term $W / f A$ may be omitted in equation (3) and the expression for ϕ^2 takes the relatively simple form

$$\phi^2 = \phi_2 \left(\frac{E}{f}\right).$$

Let us imagine that the weakest member is replaced by another of the same geometrical shape and size but with a different value of f / E, though not so different as to prevent its remaining the weakest member, then a test on each one of these models will give a particular value of ϕ^2, breaking load coefficient, and these when plotted against f / E will give a "characteristic curve" for the structure of the given geometry. For geometrically similar structures of which the corresponding parts are made of the same material, so that f / E is constant, the critical load coefficient becomes an absolute constant for the series depending for its value purely on the shape. It follows that a simple test to destruction on a model will suffice under these conditions to determine the breaking load coefficient ϕ^2, and therefore the breaking load F for any other member of the series.

Failure Due to Instability.—It is assumed in this section that the failure is not necessarily accompanied by collapse or rupture in the material but is due merely to permanent deformation of the configuration of the structure. It follows that in the expression for the critical load, the yield stress does not enter although all the other terms A, l, E, I, ρ, g may do so. Using ϕ^2 as a critical load coefficient defined by $F l^2/E I = \phi^2$ then

$$\phi^2 = \psi_1 \left(\frac{A}{l^2}, \frac{W}{E A}, \frac{I}{l^4}\right) \quad . \quad . \quad . \quad . \quad (4)$$

obtained by the same method as in the previous section.

On the understanding that the structures in the series are all geometrically similar as regards external shape without reference to material composing them, then A/l^2 and I/l^4 are constants for the series and

$$\phi^2 = \psi_2 \left(\frac{W}{E A}\right) \quad . \quad . \quad . \quad . \quad . \quad . \quad (5)$$

where $W/E A$ is the ratio of the weight of a member to the tensile or compressive force required to produce unit strain at some particular section of that member.

If corresponding members of the series are made of the same material then $W/E A$ is easily seen to be proportional to l, from structure to structure and as before the critical loading coefficient,

$$\phi^2 = \psi_3 f \quad . \quad . \quad . \quad . \quad . \quad . \quad (6)$$

depends on the size only.

When the weight of the structure is negligible as far as its effect in contributing to failure is concerned, the whole instability arising from the external loading, then ϕ^2 is constant for a series of structures of identical form irrespective of the material of which it is composed, and a test to destruction on one model suffices for the series.

It has been found that the critical loading for a uniform prismatic strut of negligible weight under end thrusts and pin-jointed at the ends is given by $F = \pi^2 \frac{E I}{l^2}$, where l = length of strut, I the least moment of inertia, and E = Young's modulus, so that ϕ for this structure is π. For a strut under the same conditions but with fixed ends $\phi = 2\pi$.

In certain cases of simple shapes of structures, it is obvious that the function ϕ^2 may be derived by calculation as for example in the case of the prismatic beam supported either on "pin-joints" or clamped supports, but for more complicated problems where the calculation is too abstruse a number of points on the characteristic curve may be derived by a series of tests to destruction on models.

In the special cases where ϕ is a constant for the series a single test on one model is clearly sufficient. This, as has been shown, applies with equal force when the collapse is due either to instability or failure of the material.

The basis of the experimental method thus having been made secure, no scale effect difficulty of the type normally arising in aerodynamic work being present, it should now be possible to proceed to a direct accurate test of failure and its causes under various circumstances. As usual there are of course both advantages and disadvantages to be faced. A model of an aeroplane or a special part sufficiently accurate for the present purpose may be constructed at comparatively little cost. All the numerous details of contour and finish that are normally necessary in the production of such a model for ordinary aerodynamic purposes now find no place here. The question as to whether exceptional care or otherwise would require to be exercised with any special portion, as for example the junctions between the fuselage and the remainder of the machine, the junction of the wires and of the spars and ribs, etc., could of course easily be settled experimentally by testing for consistency of results.

A much more serious question, however, is that involved in the possible invalidity of the foregoing analysis should Hooke's Law fail to be obeyed—a real difficulty in the case of wood of which most of the members are composed—but exactly the same trouble would arise in a mathematical investigation of the stresses brought into play. In all such cases Hooke's Law is assumed to hold.

Two further points merely require to be mentioned. There is no mathematical machinery at our disposal for determining accurately the dynamic effect of a variable load such as occurs for example when an aeroplane is executing rapid manœuvres of particular types, or when the controls are brought sharply into operation. Essentially this is of the nature of an impulsive loading and the ordinary convention that it suffices to consider it as a live load and thus to double the safety factor cannot be regarded as quite satisfactory. Physically the problems are quite distinct. Secondly, the question of the effect of vibration of and upon the structure has received scant attention. Model experimental work of the type indicated, clearly furnishes an extreemly convenient method for approaching these problems.

(*Continued from page* 289)

a full-sized aircraft programme, large enough to set the manufacturers going at full speed, with orders far enough ahead to permit them to establish efficient quantity production and keep labor happily engaged in producing, with an idea of a permanent position. Labor in the aircraft industry has been constantly upset by the fact that factories only had limited orders, with no further orders to look ahead to. Under such conditions, labor could hardly be blamed for looking for other positions. Speeding up under such conditions was very much like rushing oneself out of a job.

Secretary Ryan is Back

Secretary Ryan is back. He returned a few days ago.

"Upon reaching France," Mr. Ryan said, on October 15, "I went immediately to the front and was with our forces during the St. Mihiel fight and the battle of the Argonne.

"The air forces in both offensives were under the direction of the American commander, and, while the French furnished a large part of the forces used and the British co-operated, the American squadrons made up about half of the number participating. The commendation of the work of our pilots was tempered only by a suggestion that perhaps our boys were too venturesome and overcourageous.

"The United States De Haviland 'planes were in general use for observation and day bombing in both the St. Mihiel and the Argonne attacks, and the pilots were to a man enthusiastic as to their performances. While individual pilots and commanders had suggestions as to improvements and betterments that might be made, they were individual and seldom indicated anything more than a personal preference for some rearrangement of details.

"The commanders of all the squadrons using De Haviland 'planes, as well as 'planes of British and French manufacture for like purposes, told me that the pilots in every case would prefer to take a De Haviland machine with a Liberty engine over the line rather than any machine of a like type. This is due to the fact that the machine is fast, and for one of its type is quite manœuvrable; that it climbs well, and the pilots all agreed is a very efficient machine for the uses for which it is intended.

"On my trip the Liberty engine was the cause of more worry to me than anything else, because all of the Allied nations were demanding more of them than could possibly be supplied. French, British and Italian have used the Liberty engine in their own machines at the front, and their building programmes as now laid out are based to a considerable extent upon obtaining a supply of these motors in this country.

"I come home feeling that our allies consider the success of the United States in producing this engine in large numbers one of the greatest accomplishments in the war. Both the British and the French are now putting the Liberty motor in 'planes that formerly carried engines of either a heavier weight or less power. I can safely say that the Liberty engine, with its high power combined with lightness, has greatly increased the efficiency of some of the 'planes that the Allies have been using at the front for some time.

"Their representatives even expressed themselves to me that it has made new machines of several types."

Hon. Albert S. Burleson, Postmaster General
Hon. Otto Praeger, Second Assistant Postmaster General
Captain Benjamin B. Lipsner, Superintendent Aerial Mail Division

US
AERIAL MAIL

AERIAL MAIL PILOTS

- Max Miller
- Maurice A. Newton
- Robert Shank
- Ed. V. Gardner
- C. D. De Hart
- Louis Gertson
- R. Smith

George Langley Conner, Chief Clerk to Second Assistant Postmaster Praeger
Charles M. Kight, Special Representative
John A. Jordan, Special Representative
Frank Bowie, College Park, Md., Representative
Harry L. Hartung, Belmont Park, L. I., N. Y., Representative
H. Thomas, Bustleton, Penn., Representative

AERIAL MAIL MECHANICS

- Henry Wacker
- E. N. Angle
- A. F. Cryder
- Ed. C. Radel
- Wm. C. Read
- W. O. Beatty
- Chas. King
- J. A. Danville

The Aerial Mail Is Using Surplus Facilities

By Charles N. Kight, Special Representative of the Post Office

The following is a copy of a letter Mr. Otto Praeger, Second Assistant Postmaster General, is mailing to the Presidents of all the leading business organizations and clubs in this city, embracing in part information not previously incorporated in matter distributed in the interests of the aerial mail service:

"Dear Sir:—I desire to bring to your attention the facilities of the aerial mail service which is equal, if not superior to the telegraph in the transmission of important communications to Philadelphia and exceeds the fastest train service by two and a half hours to Washington. Letters mailed in New York in time to catch the noon aerial mail, invariably reach the professional and business element in Washington before the close of the day's business.

"This service is rendered for only three cents per ounce more than the usual special delivery letter forwarded by rail. Six cents is charged for each additional ounce.

"The Postmaster at New York will furnish any information desired, or Mr. Charles N. Kight, special representative of the Aerial Mail Service, with headquarters in Washington, will be glad to go into the subject of the aerial mail service, its accomplishments and prospects, should his presence at any time be required, to shed light on this new and interesting governmental agency.

"Sincerely yours,
(Signed) "Otto Praeger,
"Second Assistant Postmaster General."
"100 per cent. perfect service daily."

Among the very few criticisms I have met in efforts to familiarize the business element and the public generally with the superior facilities offered by using the aerial mail service, I note the following: One party said: "Why attempt to inaugurate a service by aeroplanes when both aeroplanes and pilots are needed on the battle front in France?" The answer is this: "The aeroplanes now used in this service with a carrying capacity of about 500 lbs., and a limit of speed of about 100 miles per hour have been rejected as unfit for service abroad; planes with the Liberty Motor and a carrying capacity of 1,000 lbs. and a speed limit of about 150 miles per hour, being recognized as far superior for use in France." After the war these superior planes will be at the disposal of the Aerial Mail Service, enabling the time between terminals to be shortened nearly fifty per cent., insuring the delivery of mail from New York to Chicago, for instance, being delivered in about six hours.

The pilots employed in the present service are men who have failed to pass the extremely rigid examination required to make them eligible for foreign service, or possess certain disqualifying conditions, all, however, being eminently qualified as pilots handling the planes employed in the United States Aerial Mail Service. As an evidence of the rigid tests applied to applicants desiring to enter service overseas, the following facts stand out prominently, reflecting somewhat on the government's requirements: A number of men who offered their services, and failing to pass the rigid examination, applied for service to the Canadian government, were accepted and sent abroad. To-day several of them have made a world-wide reputation, ranking high among the Aces.

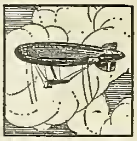
The service now effective between Washington and New York is daily growing in popularity now that it is understood that the service insures immediate delivery and, in some instances, hours in advance of time by rail mail, necessitates the use of only three cents per ounce more than required if forwarded by special delivery train service.

It is also true that the present congestion of mails, as well as delays by telegraph, owing to the shortage of help and the epidemic of influenza, has directed special attention to the aerial mail service, which makes 100 per cent. daily records, regardless of winds, storms or any other serious climatic conditions. Mail matter forwarded by the aerial mail service is in rapid motion from the time it is delivered to the planes until it reaches the party addressed.

To left: The Aerial Mail box at one of the New York hotels being cleared by a postman

To right: Captain Benjamin B. Lipsner, Superintendent of Aerial Mail Service

MILITARY AEROSTATICS



By LIEUT. H. K. BLACK, R. F. C., C. F. A.

SOME sections have had great success with a permanent screen of withes and thatches. These were built up around the bed and about ten to fifteen feet outside the ridge wire. It withstood the wind very well, I understand, but it had the disadvantage that it was not movable and also it tended to cramp the action of the crew in working around the balloon. Sometimes this is a very great disadvantage. Personally, we had fairly good success with a canvas screen which we erected and carried with us. Poles were put in the ground to which pulleys were attached and through these, ropes attached to the heavy tarpaulins were rove. In this way we were able to raise and lower the screen at will. In the terrific winds we were subjected to in France, sometimes he tarpaulins would tear to pieces and blow to ribbons before they could be re-secured. I have seen the poles, on which the screens were erected, snapped off like matches. On one occasion we secured half a dozen steel rails from a railway track and when we got them up—I say when we got them up, for it was quite some job in the wind—they were there to stay.

The main function of a screen is not so much to keep the wind from hitting the balloon as to shoot the wind upward to the curved upper surface, where it will even help to press the balloon to its bed.

Balloon Baskets

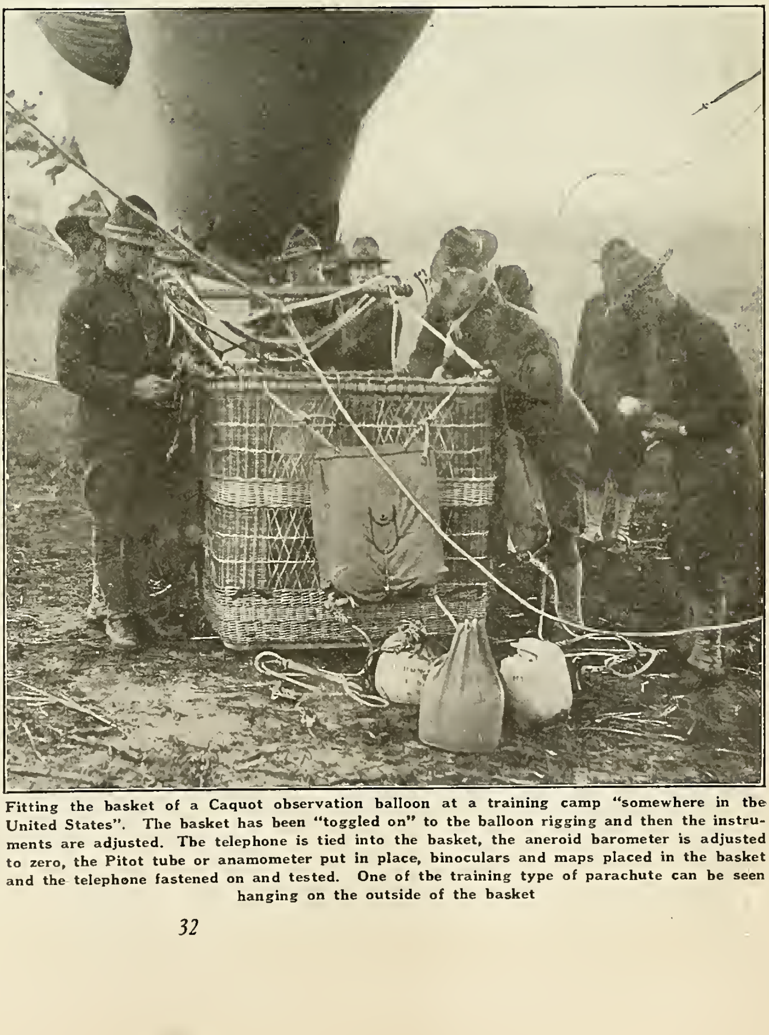
BALLOON baskets are a thing which have undergone many changes since war broke out. There was the day of the old spherical observation balloon the basket of which was a small uncomfortable affair, which sometimes, if one is to believe all the stories one hears, was not altogether too strong. It is easily imagined that those baskets would not stand up to service very long as they received rather rough handling from the wind. Landings those days were not the comfortable thing they are today. They were as often as not quite involuntary. I have seen spherical balloon baskets, however, which were fitted up comfortably, if not luxuriantly. One in particular I remember was a regular Pullman car for comfort. It was about the size of the ordinary Pullman smoking room and had a leather upholstered couch across one side very much the same as the smoking room.

With the advent of the kite balloon, however the baskets underwent a change. They were made quite a bit roomier and considerably stiffer. Nothing is quite so uncomfortable. particularly the first or second ascent, as to have a basket with a springy floor. The floor may be quite safe, but it is impossible to make the novice believe it when it is springing under his every step. Quite recently in fact, we had some balloon baskets issued to us in France. They were designed for one observer but for some reason they had been issued with a single basket balloon. That meant that two men must ascend in a basket meant for one. None of these single baskets were re-inforced with steel cables in the bottom and under the strain of two observers they did not last very long. They were not popular with any of our observers and when the writer, stepping heavily on the middle of the floor one day, felt his foot go through into the top layer of four thousand feet of atmosphere, he added his mite of condemnation. Shortly after, these baskets were condemned and double baskets issued.

The baskets at present in use in the Caquot type of observation balloon are almost square. They are about four by four and a half feet in dimensions and are designed for two observers. They can carry more. In fact in training I have seen five men in one of them but for real work on the front two men are about all they can carry efficiently. They are made of woven willow wickerwork as shown in the illustration, re-inforced by small steel cables woven in with the willow. On the bottom they have landing skids, partly to allow the basket to slide along the ground in landing and partly to add to the strength of the basket.

The interior of the basket is fitted up with the dual idea of having comfort and efficiency. To a great extent the latter is dependent, or at least augmented, by the former. The basket is lined with a rubberized fabric which is windproof. The floor is covered with a thick carpet and in winter generally with a goodly layer of straw also. In an aeroplane at great heights there is no doubt that it is much colder than in a balloon at a comparatively low altitude, but in the winter it is bitterly cold standing in a balloon basket for several hours at a time even clad in heavy flying togs. Running round the inside of the basket is a thick piece of upholstery to reduce the damage to one's hipbones in a rough landing. Pockets for the reception of maps, pencils, spare instruments, binoculars, lunches and sometimes, I fear, a stray magazine or book, for use when things get slow, or when one is "sitting up" waiting for a shooting view, are placed around the interior of the basket.

To be continued.



Fitting the basket of a Caquot observation balloon at a training camp "somewhere in the United States". The basket has been "toggled on" to the balloon rigging and then the instruments are adjusted. The telephone is tied into the basket, the aneroid barometer is adjusted to zero, the Pitot tube or anamometer put in place, binoculars and maps placed in the basket and the telephone fastened on and tested. One of the training type of parachute can be seen hanging on the outside of the basket

FOREIGN NEWS

BELGIUM

An official statement from Belgian headquarters on October 7 says:

Our aviators bombed enemy camps at Westende and Middelkerke.

During the day the enemy bombarded Nieuport and the zones about Clercken and Westroosebeke, as well as our communications in the rear areas.

German aviators are very active machine gunning our first lines and our roads near Moorslede and Passchendaele.

Ten enemy aeroplanes were brought down and three balloons burned

GREAT BRITAIN

"Twenty-two hostile machines were destroyed and three were driven down out of control. Twenty-four of our machines are missing. Twenty-two tons of bombs were dropped on Sept. 28.

"Night bombing continued with greater intensity, in spite of the unfavorable weather. Thirty-four tons of bombs were dropped, and many machines continued attacks until dawn. All the night-fliers returned."

"The air force with the navy, coöperating in the Belgian offensive on September 28, dropped thirteen tons of bombs and set fire to two trains and several ammunition dumps," says an Admiralty statement. "Massed motor transports and a hostile battery were attacked and casualties inflicted. The airmen engaged also in spotting for the monitors shelling the German coast defences.

"The latter part of the day large formations of hostile aircraft working inside the enemy lines were encountered. Four planes were destroyed and four were brought down out of control. Thirteen of our machines are missing; a majority of them failed to return from the enemy lines after a sudden and violent rainstorm."

British bombing aeroplanes during the day of September 28 contributed very greatly to the success of the operations. They bombed without cessation enemy troop columns, transports and communication lines, says a Belgian Report.

In an official report on September 30 Field Marshal Haig says:

"On Sunday fifteen hostile balloons were destroyed. Twenty-six planes were brought down, and nine others driven down out of control. Nineteen of ours are missing. Thirty-six tons of bombs were dropped on railway stations and junctions.

"The air force, in coöperation with the navy, bombed enemy destroyers and raided Zeebrugge, Ostend, and Bruges, and aerodromes in the vicinity of Ghent. Twelve hostile machines were destroyed, and fifteen driven down out of control. Ten of ours are missing."

The following shows the six points from the coast of Flanders to the fringes of the Syrian desert where the Royal Air Force have operated recently:

Destructive air raids on German submarine, naval, and aircraft stations in Belgium.

Air fighting between La Bassee, Peronne, and the St. Quentin road.

Sixteen heavy bombing raids by the Royal Air Force independent section in Germany.

Low-height bombing and machine-gun fighting from the air on the roads to Strumnitza.

A double raid on Constantinople, causing damage to the station and military buildings at Nagara and Stamboul.

Great aerial activity on the Palestine front, resulting in much destruction of enemy transports, stores of war material, and heavy casualties to the retreating enemy.

For some time past contingents of the Royal Air Force and the Australian Flying Corps have been carrying out a reconnoissance over the maritime plain stretching from Mount Carmel on the north to the Shechen-Joppa road, as well as over Samaria and the Valley of the Jordan. Acting in coöperation with the infantry and cavalry units, British airmen on the night of September 18 bombed the enemy railway junction of El-Afuleh in the plain of Esdraelon, south of Nazareth, hindering the despatch of reinforcements from the south. Through the following day they continuously bombed the enemy's headquarters and harassed the retreat by firing thousands of rounds against troops and transports, and dropping more than eleven tons of bombs on various objectives behind the enemy's lines.

On the Salonica front, on the morning of September 21, British aeroplanes brought timely advice of the impending retirement of the enemy. Later in the day they saw that the Kosturine-Sturza road was densely packed with troops and transports hurrying to the rear. Squadrons of British airmen continuously attacked these from a low height, causing much material destruction and many casualties.

In the course of a single air fight between four British machines and fourteen enemy craft two of the hostile machines were destroyed, while one British aeroplane failed to return.

On the western front in France, in addition to dropping nearly 140 tons of bombs, destroyed ninety-one enemy machines, drove down thirty-five out of control, and shot down eight kite balloons in flames. Forty British machines were reported missing. On the Rhine front nearly fifty tons of bombs were dropped during the week on railways, blast furnaces, factories, and hostile aerodromes. In Italy six enemy machines were destroyed and three were driven down out of control. All the British aeroplanes returned safely.

The British Air Ministry issues the story of a neutral resident who has just returned from Germany with information on the effects of recent British air raids over the Rhine provinces, particularly in Frankfort.

The central part of the Frankfort main station was so extensively damaged by bombs that trains have not been able to enter and are being operated from hastily constructed platforms some distance from the station. The people of Frankfort, according to this neutral, are in a state of nervous excitement. At the least unusual noise the people retire to their cellars, not daring to sleep in their apartments.

As to the moral effect of the raids, the neutral says he heard nothing but the most depressing talk of the present conditions in Germany and the prospects of further attacks from the air.

The Treves Railway was bombed by the British independent air force Tuesday, according to an official statement issued October 2.

British aerial squadrons bombarded Lichtervelde, causing a fire at the railway station. They also broke up several enemy convoys.

The Cologne *Gazette* frankly acknowledges that "these raids are having the effect on morale which the Entente Allies intended."

It speaks of how the pessimism of the bombed districts is spreading to other parts of the empire through letters written from the Rhine towns.

And the air offensive is not only directly but indirectly having its effect on the military operations—through the German efforts to increase their air power and the consequent drain on other branches.

British air power is constantly increasing and the Air Ministry is taking every possible step to see that the fliers' and workers' efforts for the country do not "set them back" when they return to civil life. Almost every mechanical trade is taught in the training schools, and exceptional educational advantages are offered.

The British losses are comparatively light, the air chiefs state. They announce that one machine is lost or damaged for every five tons of bombs dropped, or one machine for every six raids.

The British airmen during the last three months have wrought heavy damage to military objectives in Western Germany and forced the withdrawal of several enemy air squadrons from the battlefront in a vain effort to protect the raided territory, the British Bureau of Information announced here on October 4.

A 250-mile belt of the Rhine Valley, in which are located the principal German war industries and railway systems vital to maintenance of the Teutonic lines in France, has been brought definitely into the war zone, the statement said. British fliers have raided enemy territory 249 times and dropped 247 tons of bombs on strategic points. Aside from destroying or damaging munition and poison gas factories, railway stations and trains, the attacks have had a widespread moral effect, demonstrated at dozens of public meetings in the Rhine towns demanding cessation of aerial warfare.

FRANCE

Concerning aerial activities of September 27 the official statement from the French War Office says:

"Our bombing aeroplanes made expeditions during the day and night incessantly harassing enemy transports and troops and attacking convoys. Twenty-five tons of bombs were dropped behind the battlefront, especially on the railroad from Somme-Py to Challerange and on the important centres of the Medeah Farm and Ardeuil and on the crossings of the River Alin. At night the railroad stations at Longuyon and Audun-le-Roman and the aviation field at Stenay were bombarded heavily.

"French aeroplanes destroyed nine German machines and set on fire one captive balloon. It is confirmed that Lieutenant Fonck alone destroyed six enemy machines on September 26."

Lieutenant Fonck's total now aggregates sixty-six.

Fonck's latest feat duplicates his own record and also those of Captain Trolloppe and Lieutenant Claxton, both of the British Flying Corps.

The statement of Sept. 30 says:

"On September 30 our aviators destroyed and put out of the fight twenty-five German aeroplanes and set fire to two captive balloons.

"Twenty-six tons of bombs were dropped on convoys and concentration points behind the enemy lines, especially on Challerange, Liry, and Mont St. Martin. Thousands of rounds were fired at the enemy troops by French airmen."

FRENCH

The French official on aviation, issued October 3, says:

Our bombarding squadrons surprised gatherings of the enemy which were being formed in the region of Contreuves and Mont St. Martin. They attacked them with bombs and machine guns. Twenty-six tons of bombs and thousands of cartridges were used with good results.

Ten enemy aeroplanes were destroyed or put out of action. A balloon was set on fire.

The report for October 5 says: "Nineteen enemy machines were destroyed by our aviators and three balloons set on fire. Bombing aviators dropped during the day 1,700 kilograms of projectiles. Several thousand rounds were fired at enemy troops and more than five tons of bombs were dropped on them.

"Thursday night bombing aviators dropped twenty-nine tons of bombs on enemy cantonments and bivouacs in the region of Lens and in the Valley of the Suippe and on railway stations.

"Captain Raymond, commander of the famous Stork Escadrille, has died in a hospital at Chalons-sur-Marne of injuries received in an accidental fall."

GERMANY

The German official for October 4 says:

On October 3 we shot down thirty-seven aeroplanes and two captive balloons.

On October 5 the German official said:

In the last two days sixty-five aeroplanes were brought down.

Berlin, September 26, via London.—Allied airmen lost seven aeroplanes in an attack on Frankfort-on-Main and Kaiserslautern, according to the German headquarters' statement to-day.

Great headquarters issued the following on September 28:

Yesterday we shot down thirty-three enemy aeroplanes.

On September 28 we shot down thirty-two enemy aeroplanes and three captive balloons.

We shot down forty-five enemy aeroplanes on October 1.

On October 1 we shot down twenty-seven enemy aeroplanes and three captive balloons.

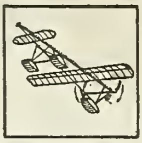
ITALY

The Italian War Office has issued the following:

Our airships have bombed Primolano and Fucine.

MODEL NEWS

Edited by John F. McMahon



CLUBS

PACIFIC NORTHWEST MODEL AERO CLUB
921 Ravenna Boulevard, Seattle, Wash.
BAY RIDGE MODEL CLUB
8730 Ridge Boulevard, Bay Ridge, Brooklyn
INDIANA UNIVERSITY AERO SCIENCE CLUB
Bloomington, Indiana
BROADWAY MODEL AERO CLUB
931 North Broadway, Baltimore, Md.
TRIANGLE MODEL AERO CLUB
Baltimore, Md
NEBRASKA MODEL AERO CLUB
Lincoln, Nebraska

DENVER MODEL AERO CLUB
2820 Raleigh St., Denver, Colo.
BUFFALO AERO SCIENCE CLUB
c/o Christian Weyand, 48 Dodge St., Buffalo, N. Y.
THE ILLINOIS MODEL AERO CLUB
Room 130, Auditorium Hotel, Chicago, Ill.
SCOUT MODEL AERO CLUB
304 Chamber of Commerce Bldg., Indianapolis, Indiana
MILWAUKEE MODEL AERO CLUB
455 Murray Ave., Milwaukee, Wis.

CONCORD MODEL AERO CLUB
c/o Edward P. Warner, Concord, Mass.
MODEL AERO CLUB OF OXFORD
Oxford, Pa
CAPITOL MODEL AERO CLUB
1726 M Street, N. W., Washington, D. C.
CORRESPONDENCE MODEL AERO CLUB
320 N. Main Street, Rockford, Ills.
AERO CLUB OF LANE TECHNICAL HIGH SCHOOL
Sedgwick & Division Streets, Chicago, Ill.

Model Aeroplane Building as a Step to Aeronautical Engineering

The next and final part to be made is the rudder or vertical stabilizer. This part is fastened to the tail booms rigidly and is made of the same stock as the tail plane. Note the two cross pieces at the center with just enough space between to allow the tail to be inserted and fastened in place. The two uprights are fastened outside of the tail piece.

When covering, the fabric should be fastened to these center cross pieces and then down to the bottom or top piece.

The tail booms are made of spruce, 1¼", fastened to the ends of the tail booms for fastening to the rear spars of the wing assembly. The plate is fastened to the bottom side of the boom on the top spar and the top side of the boom on the bottom spar, as shown in the sketch to the right of side view. These plates are fastened to the booms and the spars by bolts for ease in assembling and dismantling. A sketch of the rear view is shown at the lower left-hand corner of the cut. This will clearly show the method of bracing in use.

A clip for fastening the wires is also shown. This clip is made of sheet steel. A small hole is drilled for the wire and a larger one for the bolt.

When glider is assembled, as shown in the two views at the right, the builder can test the strength of it by setting main section on two wooden horses and taking his place in the operator's space. The horses should be placed a point directly under the middle pair of struts, and taking care that the wing beams set firmly on the horses. If the wings show no sign of bending, it is safe to fly with the glider.

To fly, the operator can select a slight rising of ground with no obstructions, such as trees and the like, face into the wind, run to the edge of the hill and cast himself off. If balanced properly the glider will make a graceful glide to a point some distance away on the level ground.

The writer would not advise trying this from a high hill at first, or when the wind is blowing too strong, as it is best to practice under less severe conditions at first until the operator knows how to control the machine.

The control of the glider is simple and needs but little practice. For instance, the operator hooks his arms over the two bars running from the forward to the rear struts. This allows his legs to move where he wishes to put them. The operator should locate his body as far forward as possible.

When in the air, should the right wing of the glider be lifted higher than the left, the operator promptly throws his legs to the high side, thereby changing the center of gravity so that the load moves to the high side and it falls back to normal, and the same should be done to the left side if that wing rises. The legs also control the rising and falling motion of the machine.

Should the builder wish to make towed flights, wheels can be affixed to the bottom wing spars at the center of the machine, by "V" shaped struts, as shown in the sketch.

The wheels and struts should be as light as possible in order to keep down the weight of the machine.

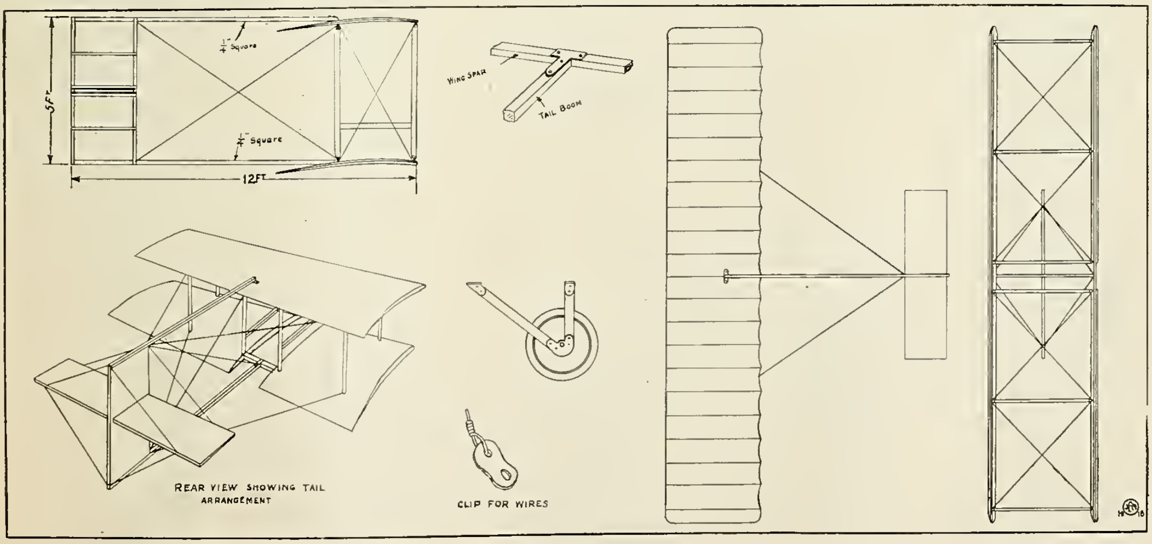
Don't attempt towed flights until you are well acquainted with every move of the glider when in free flight.

The weight of the glider, eighty pounds, might look heavy and the operator will think it is impossible to run with a machine of this weight, but this is a mistaken idea, as the curve of the wings is such that the slightest wind blowing against them will almost hold the machine in the air, with the result that the operator will have nothing to do but run and he will find himself lifted clear of the ground.

The operator will experience a wonderful sensation the first time he feels himself lifted clear of the ground, and after the first flight he will never be satisfied until he has a powered machine and can travel in any direction. It is well to remember that the Wright Brothers, Curtiss, Chanute, Montgomery and others got their first feeling in the air from a glider flight, and this is the real stepping stone to powered flight.

We will now take up the more important work of designing and building a powered machine.

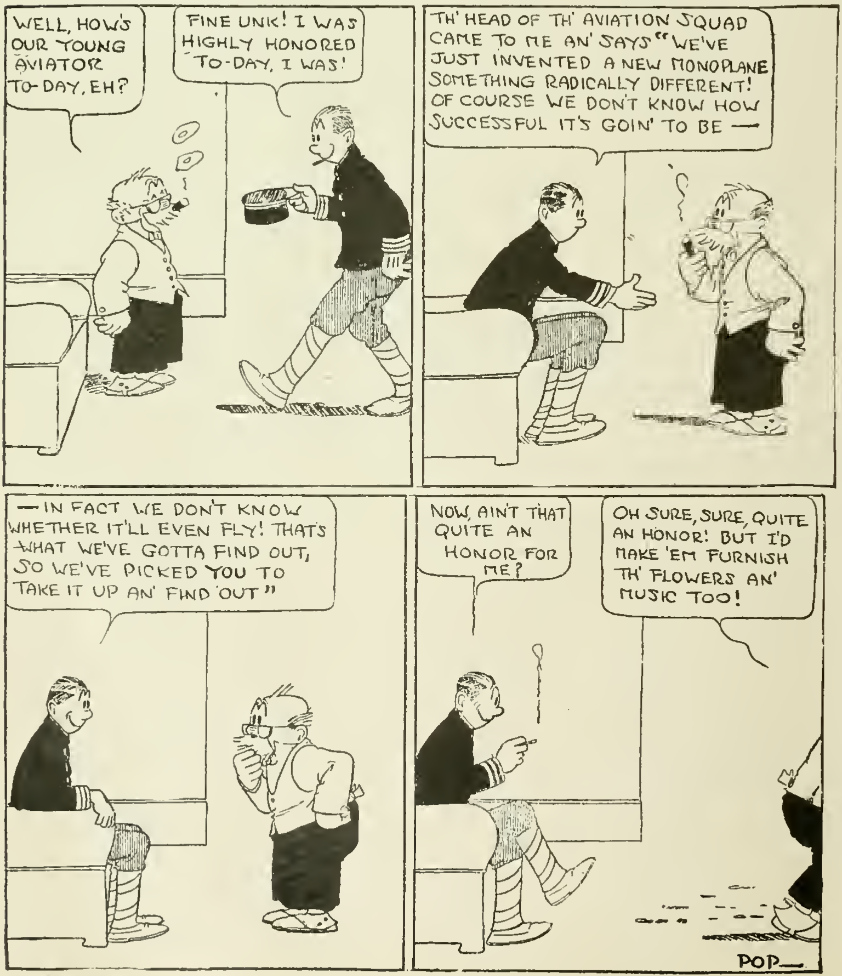
(To be continued)



Aeronitis is a pleasant, a decidedly infectious ailment, which makes its victims "flighty," mentally and physically. At times it has a pathologic, at times merely a psychologic foundation. It already has affected thousands; it will get the rest of the world in time. Its symptoms vary in each case and each victim has a different story to tell. When you finish this column YOU may be infected, and may have a story all of your own. If so, your contribution will be welcomed by your fellow AERONUTS. Initials of contributor will be printed when requested.

Wanted—Almost Anything

Dear Mother—Squadron life, they say,
Is fearfully exciting.
It's rot. For half an hour today
There wasn't any fighting.
They tell you War's a thrilling Game,
Ye gods, it's nothing if not tame.
Our fellows pulverized just now
A host of Hun formations.
And then they bombed—the Lord knows how,
A crowd of railway stations.
I can't think why the game's so slow,
There's still a war on, don't you know?
I chased a Hun a dozen miles,
And ultimately licked him.
The C. O.'s face is wreathed in smiles;
That Hun's my thirteenth victim,
But life is stagnant none the less.
(Hello! a bomb's dropped on the Mess.)
"As tedious as a twice-told tale"—
That's Shakespeare's own expression.
Monotony has made me stale;
I long for a digression.
I haven't crashed since yesterday,
When will adventures come my way?
If this is warfare, Mother mine
(Hellup, the roof has vanished).
Then give me back the days divine
Ere motor bikes were banished.
If this is war, then may it cease
And let's have an exciting peace.

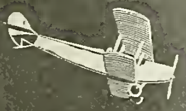

WELL, HOW'S OUR YOUNG AVIATOR TO-DAY, EH?
FINE UNK! I WAS HIGHLY HONORED TO-DAY, I WAS!
TH' HEAD OF TH' AVIATION SQUAD CAME TO ME AN' SAYS "WE'VE JUST INVENTED A NEW MONOPLANE SOMETHING RADICALLY DIFFERENT! OF COURSE WE DON'T KNOW HOW SUCCESSFUL IT'S GOIN' TO BE —
— IN FACT WE DON'T KNOW WHETHER IT'LL EVEN FLY! THAT'S WHAT WE'VE GOTTA FIND OUT, SO WE'VE PICKED YOU TO TAKE IT UP AN' FIND OUT"
NOW, AIN'T THAT QUITE AN HONOR FOR ME?
OH SURE, SURE, QUITE AN HONOR! BUT I'D MAKE 'EM FURNISH TH' FLOWERS AN' MUSIC TOO!
POP—

Courtesy N. Y. Globe

Revenge

I have often thought
Of
The only way
To get back at
The censor.
Supposing that
You
And your Lieutenant
And your Lieutenant's
Fiancee
Came from the same town
And went to school together.
As he reads all
Your letters,
Why not keep up
His interest by
Writing
Passionate love letters
To
His Fiancee.
Oh, Joy.
Oh, Rapture.
Oh, Blisters.

MY SOLDIER



Now I lay me down to sleep
I pray the Lord my soul to keep.
God bless my brother gone to war
Across the seas, in France, so far.
Oh, may his fight for Liberty,
Save millions more than little me
From cruel fates or ruthless blast,—
And bring him safely home at last.

BUY WAR SAVINGS STAMPS

COMPLIMENTS OF
CURTISS AEROPLANE AND MOTOR CORPORATION

W.S.S. W.S.S.

Trans-Oceanic Float System For Airplanes

A SUCCESSFUL METHOD FOR PONTOONING THE ATLANTIC INVENTED BY ALFRED W. LAWSON

There are eleven strong reasons why the Trans-Oceanic Float System invented by Alfred W. Lawson should be established and put into operation at once.

1. It would enable us to send all of the airplanes we can build in America to Europe.
2. It would get airplanes from America to Europe in 90% less time than it now requires.
3. It would save the number of machines lost in the holds of torpedoed ships.
4. It would be the means of furnishing 24 hour service for mail delivery between America and Europe.
5. It would establish 24 hour passenger carrying service between America and Europe.
6. It would establish a safety lane for shipping between America, England, France, and Italy.
7. It would mean the saving of approximately $300,000,000 for every 50,000 airplanes sent across the Atlantic Ocean.
8. It will stamp the U. S. A. as the foremost nation of the world to put into operation the biggest of practical plans.
9. It will be the forerunner of commercial air navigation and rapid trans-oceanic traffic.
10. It will benefit every aircraft manufacturer in the world as well as increasing the efficiency and scope of the entire aeronautical industry.
11. It will bring all of the great nations of the world into close association with the U. S. A. and make this Country the source of supply to all humanity.

According to this system any airplane that is capable of flying and carrying more than one hour's fuel and oil can be flown across the Atlantic or any other ocean.

Any aviator who has graduated from a military training school will be qualified to pilot an airplane across the ocean according to Mr. Lawson's system, the chief requirement being that he knows how to make a good landing.

It will be easier for a pilot to fly across the Atlantic Ocean by this system than for one to make a cross country flight of the same number of miles, for the simple reason that by this system the landing place is always within sight and within gliding distance.

Briefly an outline of the plan is as follows:

Approximately 25 miles apart between the coast of America and the coast of Europe will be placed floats upon which the pilot can land and depart from, whenever he wants to descend for fuel or repairs.

These floats are to be approximately 500 feet long and 100 feet wide, but can be increased in length and width if preferred.

These floats are built in the shape of regular steamship hulls and are kept in their position of latitude and longitude by their own power.

These floats are protected from submarines by carrying longer range guns than the submarines carry and also by a system of nets which protect them against torpedoes. They are also further protected by the airplanes which carry a supply of bombs for that purpose.

In the holds of these floats are carried the supplies of fuel and spare parts for airplanes, as well as a repair shop, and sleeping apartments, and dining rooms, etc., for the pilots and crew.

The float contains a slowing up process whereby the speediest machines can be stopped within 300 feet and slow machines within 100 feet.

There are elevators arranged at both the bow and the stern of the float whereby airplanes can be let down into the hold and receive their fuel and repairs out of the way of other machines while landing.

The float is always headed into the wind so that the pilot always lands into the wind from the stern, while he is let down into the hold at the bow and then moved back in the hold of the stern again where he is elevated to the deck from whence he starts off on his journey again into the wind. By this method, airplanes can be landed and sent off again at the rate of one every five minutes.

On condition that each machine stops at every 4th float more than 1,000 airplanes can be transported from America to France every day that the weather is suitable.

It is estimated that there are more than 150 suitable flying days over the Atlantic Ocean during the course of a year, so that by this system it is possible to send to France more than 150,000 airplanes of every description in a year.

By this system airplanes can be sent across the Atlantic Ocean within twenty-four hours, or they can be sent from factories in the interior of the United States to the battlefronts in the interior of France within forty-eight hours, thus saving all of the material and labor necessitated in crating the machines at the factory and uncrating them and setting them up at the battlefields.

At the present time by steamship methods it requires more than thirty days to deliver airplanes from the factory in America to the battlefront, and therefore more than 90 per cent in time will be saved by this system in delivery of machines.

This system will also save the transportation cost of the pilots who will also receive some much needed practice in flying en route. If 50,000 airplanes were transported across the Atlantic by this system, that would mean a saving in shipping facilities for 100,000 more troops alone. It would also save enormous shipping facilities for other war materials that would take the place of the space occupied by the extreme bulky airplanes.

Besides the time and shipping facilities saved on the transportation of 50,000 airplanes an approximate saving in the cost of transportation will total more than $300,000,000.

This system can be put into operation within four months after it has been begun and Mr. Lawson is ready to give an actual demonstration of its practicability whenever called upon to do so.

Many letters have been received from the leading aircraft engineers and manufacturers of the United States in which they say that they have examined Mr. Lawson's system and find it practical in every way.

The engineering force of the Lawson Aircraft Corporation are unanimous in their praise of the system, and the Lawson Aircraft Corporation herewith publicly advocate and recommend that the United States Government give it a trial and if found practical to utilize it at the earliest possible moment as one of the short cuts to the heart of the Kaiser.

THE LAWSON AIRCRAFT CORPORATION

GREEN BAY :: :: :: :: :: WISCONSIN

ALFRED W. LAWSON

:: *Vice-President and General Manager of* ::

THE LAWSON AIRCRAFT CORPORATION

Alfred W. Lawson, the Inventor of the Trans-oceanic Float System which enables an ordinary pilot to take any type or an overland airplane across the Atlantic Ocean or any other ocean by its own power has been for the last two years the Vice-President and General Manager of the LAWSON AIRCRAFT CORPORATION of Green Bay, Wisconsin.

During these two years, Mr. Lawson has given ample demonstratoin to the Directors of the LAWSON AIRCRAFT CORPORATION that he is most practical and conservative in all of his undertakings.

THE LAWSON AIRCRAFT CORPORATION manufactures only the latest types as well as the most practical airplanes, and as Mr. Lawson is a practical pilot of airplanes, as well as a builder of them, and as he has also spent a large part of his life at sea, the Trans-oceanic Float System was therefore invented by a man who based his plans upon the knowledge he had already gained by practical experience.

Alfred W. Lawson was one of the first of the pioneers of aviation in America. He began his active work in the movement in 1907 which was before the Wright Brothers made their memorable first public flights in France and the United States. In fact it was in 1908 that Wilbur Wright gave the first demonstration of the Wright Biplane to the French Government in France while Orville Wright during the same year demonstrated the Wright machine to the United States Government at Washington, D. C.

Just before these famous public flights were made by the Wright Brothers, Alfred W. Lawson founded his first Aeronautical Magazine, FLY, in Philadelphia and through the columns of this periodical he did the first missionary work for the aeronautical movement in this country.

After editing FLY for over a year Mr. Lawson went to New York and founded the magazine AIRCRAFT in 1909 and from that year until the fall of 1914 he was the editor-in-chief of that periodical. During that time AIRCRAFT established a reputation as being one of the foremost aeronautical magazines in the world and Mr. Lawson's writings on aeronautic subjects were quoted by aeronautic authorities in every country. It was, in fact thru the inspiration of Mr. Lawson's enthusiastic editorials and articles on the future possibilities of air transportation that started into the movement thousands of men who have since taken a leading part in development of the industry. Many of the present authorities on aeronautics in America are proteges of Mr. Lawson and manufacturers of most of the leading plants as well as aeronautical engineers, designers, managers, superintendents and foremen of these plants were urged into the business either directly or indirectly by Mr. Lawson.

Mr. Lawson's activities entered into every branch of aeronautics. He helped to organize the Belmont Aircraft Meet in 1910 and also the Chicago Meet in 1911—these being the two classiest aeronautical sporting events ever taking place in America.

In 1911 Mr. Lawson was associated with Henry Farman, the leading Aeroplane builder of France, who established in this country the Farman Company of America of which Mr. Lawson was President.

In 1912 he edited the aeronautical section of the Websterian Dictionary and introduced into that lexicon many new and original words including the word Aircraft. In fact, it was Mr. Lawson who actually coined the word Aircraft which is at the present time the most used aeronautical word in the world. This word was coined by Mr. Lawson in 1907 and in 1910 he had the word Aircraft registered in the United States Patent Office as a trade mark for the magazine he published.

In 1912, he was elected first vice president of the Aeronautical Manufacturers Association of America.

In 1913, Mr. Lawson learned to fly both the Sloane-Deperdusin and Moisant-Bleriot Monoplanes at the Hempstead Plains, L. I., Aerodrome.

The same year he purchased a Thomas Flying Boat and became distinguished as the first New York Air Commutor by flying from his country residence at Seidler's Beach, New Jersey, to the foot of 75th Street, New York City, a distance of 35 miles.

He has since then flown almost every type of airplane made in America.

During his career as editor of aeronautical magazines, Mr. Lawson outlined in his writings in advance practically every important step that has since taken place in the development of aeronautics besides making suggestions that proved of great value to the movement. He also went through a great deal of personal expense and inconvenience to petition Congress on different occasions to appropriate funds with which to establish a large American Air Fleet.

During the past year Mr. Lawson has been furnishing the U. S. Congress with a bi-weekly Bulletin concerning Aircraft information.

There is no man who has done more to advance Aviation in America than Alfred W. Lawson. There is no greater authority on aeronautics than he. His name is well known to every man in the aeronautical world, either at home or abroad.

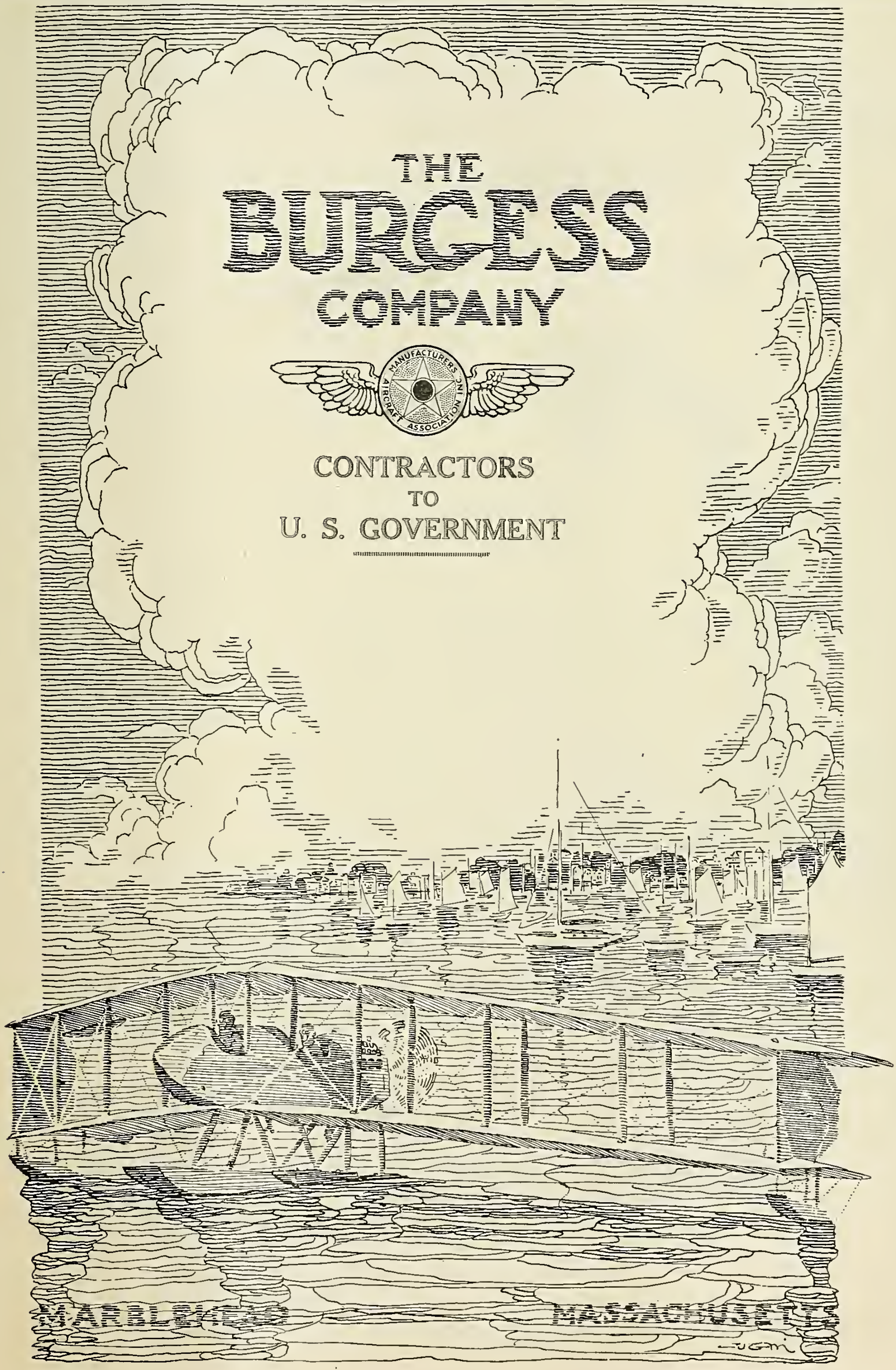
OBSERVING

Manufacturers for the United States Government

The Dayton Wright Airplane Co.

DAYTON, OHIO

"The Birthplace of the Airplane"



THE
BURGESS
COMPANY

MANUFACTURERS AIRCRAFT ASSOCIATION INC.

CONTRACTORS
TO
U. S. GOVERNMENT

MARBLEHEAD MASSACHUSETTS

THE slowest speed at which an aeroplane can land is thirty-five miles an hour. Some of the largest machines weigh five tons and cost $60,000.

Unless the elastic Shock Absorber Cord is of the best quality to neutralize the shock of landing the aeroplane may be 'crashed' and the aviator killed. Our Shock Absorber Cord is the best insurance against such accidents.

We make Special Cords for Special requirements — Radiator Hose, Gas Hose, Molded Rubber Bumpers and Miscellaneous Rubber Items.

The Ohio Rubber Co.

Headquarters :
Cleveland, Ohio

Branches :
**Cincinnati, Ohio, and
Detroit, Michigan**

The VICTOR AIRCRAFT CORPORATION

TRADE MARK

Manufacturers of

AIRPLANES *and* SEAPLANES

For Military and Sporting Purposes

FACTORY

Freeport, Long Island, New York

(*Continued from page 282*)

tremendous distance between the two wings, which would prevent one wing from competing against the other, brought about the conclusion to give two trophies instead of one.

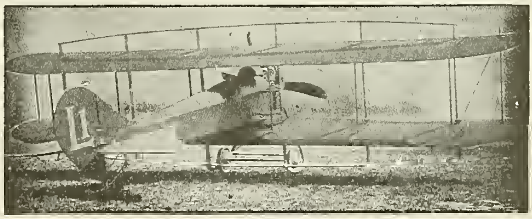
The decision to have two trophies for the Naval and Marine Corps Air Stations was brought about by the fact that the tremendous distance between the Atlantic and Pacific Coast Stations would prevent competition between the two groups.

(4) Each of the four trophies is to cost $1,000.00, and with each trophy will be given five $100.00 Liberty Bonds, making five prizes of $100.00 each to go with each trophy. The idea in giving these Liberty Bond prizes was that while, under the rules of the competition, a station or squadron would have to win the trophy three times in succession to get permanent possession of it, the winning station or squadron would get a $100.00 Liberty Bond prize, immediately upon winning the contest.

It is left to the Military, Naval and Marine Corps authorities to decide whether the $100.00 Liberty Bond prizes shall go to the squadrons, or to the stations, or the individuals competing.

The Military and Naval officers who were consulted by the Aero Club of America authorities stated that the offer of these trophies and prizes would greatly add to the interest of the work of training and developing professional efficiency in the Air Service. They pointed out, in the event it were not possible to hold contests between squadrons or stations, it would be possible to award the trophies and prizes for the greatest efficiency shown by the squadron or stations in their respective work, during a given period of time. For instance, one station or squadron may specialize in formation flying, another in bomb dropping, another in cross-country flying, another in patrolling, etc. Each station or squadron keeps a close record of its work, thereby making it easy to figure the percentage of efficiency, and the station or squadron having the largest percentage within the given period of time, would be awarded the trophy and prize for that period.

In the event that the Military, Naval and Marine Corps authorities decide to hold the contests, or award the prizes, once each month, and the trophies are not won three times in succession by the same station or squadron, then the competition will continue until some one station or squadron does win it three times in succession.



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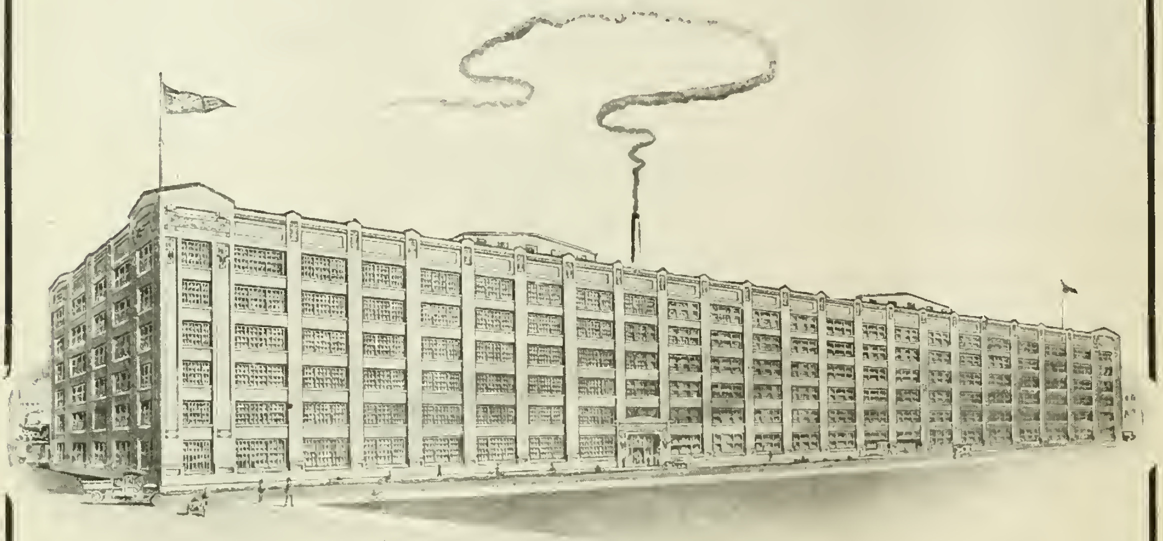

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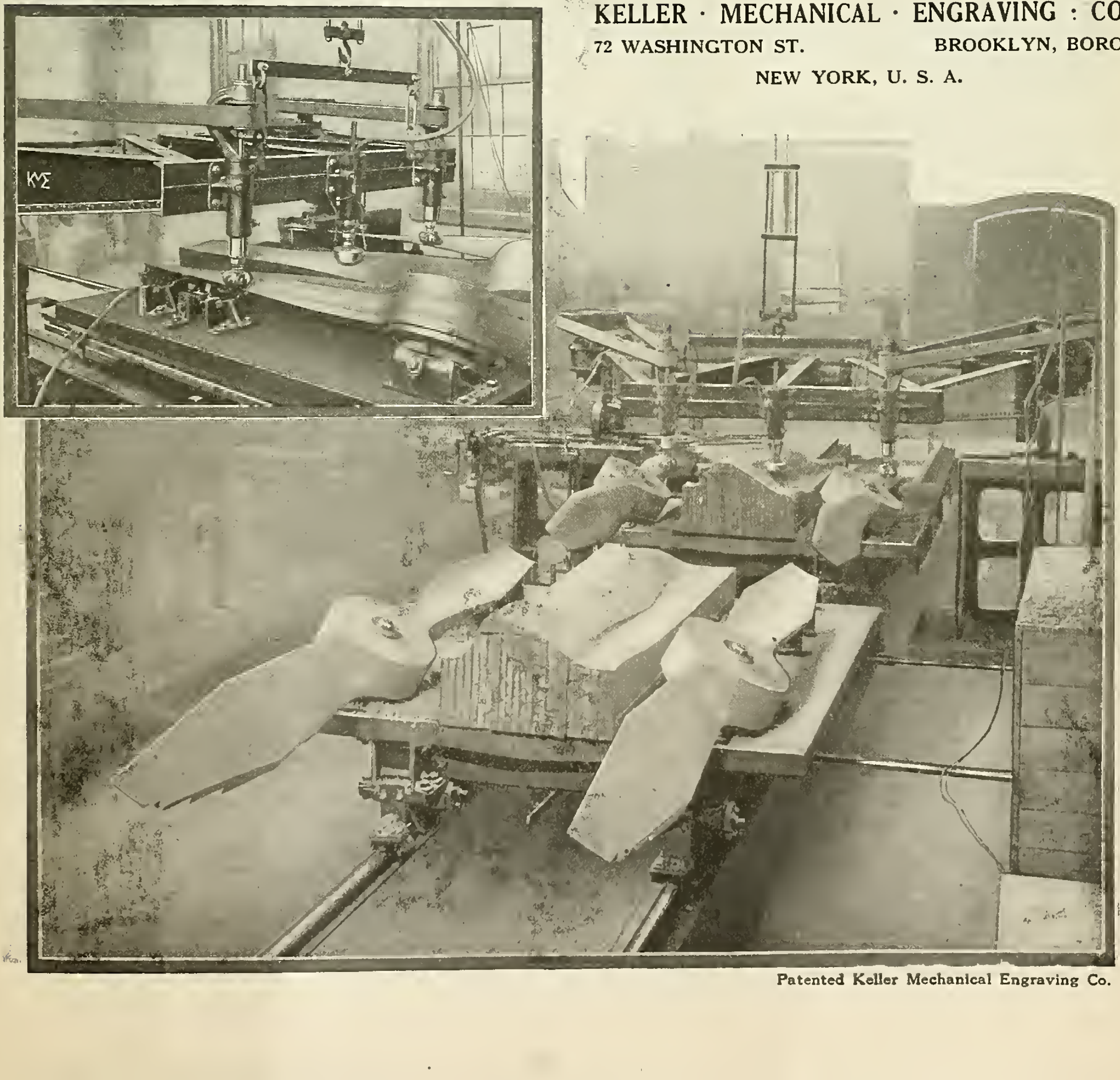

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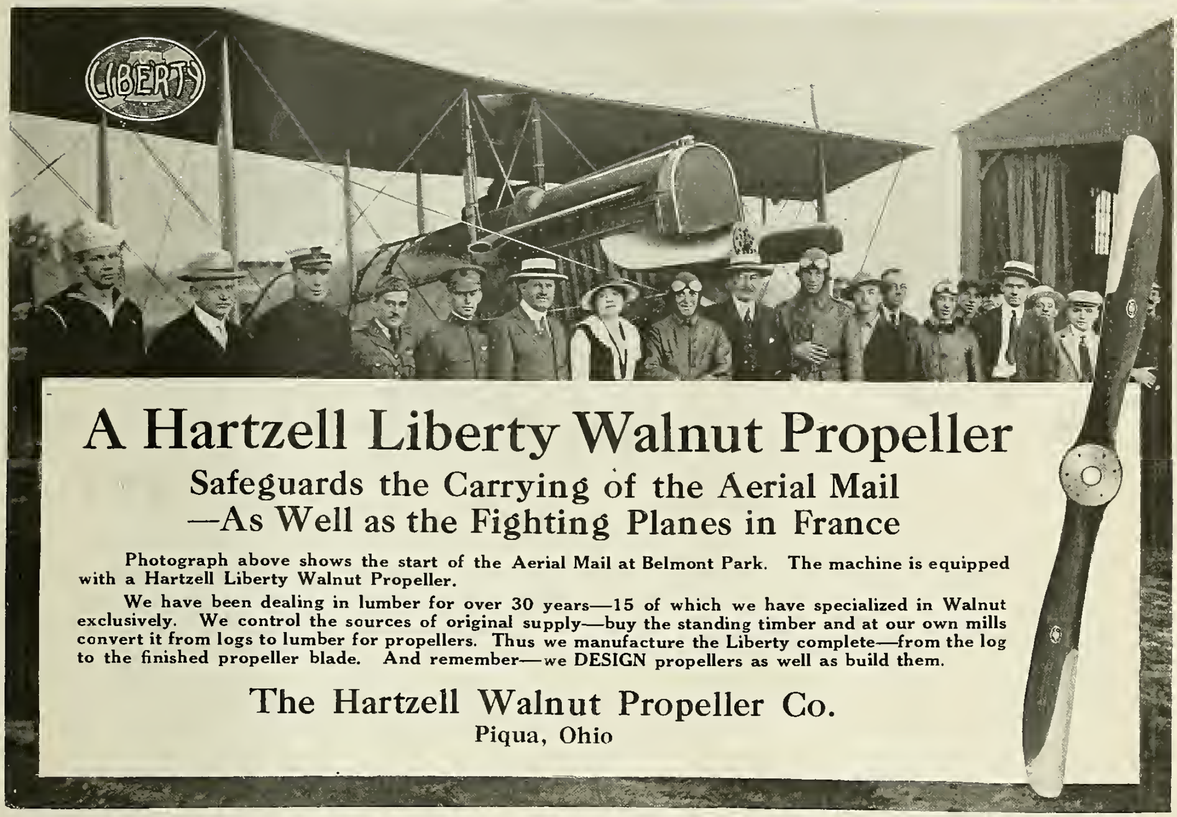

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O

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O'Neil, Larkin A	CJW
Osborne, Loyall A., Jr	CGC
Otto, Charles D	PWM
Orr, Alexander B	RSD
Oaks, John C	CJW
O'Connor, Nicholas Ray	SLA; RWT
Older, Fred Ray	SLA; RWT
Olmstead, Robert S	PWM
Osborn, George Morris	PWM

P

Paulson, Carl F	PWM
Perlman, Samuel C	PWM
Petraborg, Jerrold A	PWM
Phillips, Eldon P	ABC
Porter, Lester L	CGC
Percy, Charles, Jr	CGC
Peterson, Vance C	PWM
Pierce, Richard W	SLA
Perkins, Edward W	GLC
Pfeifer, Carl Boes	CPA
Plantz, Edward C	CGC
Port, John T	PWM
Pearson, Alexander, Jr	PWM
Polk, Claude A	PWM
Polson, Harold J	EOT
Pierson, Earle L	CGC
Peterson, Frank L	PWM
Payne, Donovan Archer	SLA; EOT
Pearce, Howard B	CGC
Pepin, William H	CGC
Pratt, Herbert G	CGC
Peterson, Joseph H	DAP
Page, Silas	SLA; KST
Parmenter, Lewis E	Note 7
Percy, James Charles, Jr	SLA; BFT
Prall, Bryan, W	PWM
Peterson, Helge A	TFT
Parmenter, Harley H	CGC
Perry, Donald I	PWM
Preisker, William H	EOT
Pierson, Ellis H	CGC
Plaut, Leonard	CGC
Parsons, Jay Hamilton	FLA

R

Reed, John S	PWM
Rafferty, Harry R	CJW
Robbins, Oliver K	CGC
Rogers, Dudley T	CGC
Rentschler, Fred Brant	CPA
Raleigh, John F	PWM
Ray, Harvey T	TFT
Ross, Stephen A	TFT
Riley, Boyd T	TFT
Radford, William A	PWM
Russell, Foster	PWM
Ricbards, Fletcher D	PWM
Rowe, Elmer C	PWM
Reynolds, Harry I	LHV
Rigg, Doughman D	CGC
Ruegg, Joseph A	PWM
Parker. Roy C	CJW
Rossell, John E	DMA; HHN; Note 1
Rowe, Lindley Phelps	SLA; LDT
Reed, John S	Note 9
Rieck, Henry Thorsen	SLA; TMA
Richey, Robert George	SLA: MAC
Rohinson, Archbold H	PFO
Richards, Archer Card	SLA; ELA
Riley, Howard Wade	SLA; CRI
Richman, Raymond	RSD
Roe, Joseph W	MJA
Reed, Charles	CPA
Rhodes, Solomon Martin	SLA; PMT
Raabin, Herman D	CGC
Robertson, George A. S	FRF
Rank, Levin	SLA; LHV
Roberts, Hamilton H	PWM
Ray, Chester Morse	SLA; SAG
Russell, Herhert Owen	CPA
Ryan, Herbert Wincox	CPA
Reid, Herhert W	CJW
Ready, Frank J., Jr	LHV
Rodefeld, Edward Frank	SLA; PMT
Reid, Walter D	CGC
Robson, William W	CGC
Reynard, Lester A	EOT
Rose, Charles B	LTA
Roehlk, John	LHV
Rav, William A	TFT
Radcliffe, Harry Elwood	FLA
Rideout, George R	PMT
Ramsey, James N	CJW
Renz, Walter F	EOT
Richardson, Durston G	PWM
Reiman, Benjamin C	Note 9
Reynolds, Francis Anthony	SLA; FOB
Reynolds, Francis Anthony	SLT; FOB
Ritterbusch, Walter H	PWM
Rogers, Franklin L	CGC
Riddle, Earle C	CGC
Rothrock, Ross P	EOT
Ready, James B	CGC
Reeve, Howard E	CGC

S

Smith, Jerome T	UCB
Sharp, Leigh Robertson	SLA; PWM
Schreiber, John A	BFT
Strawn, Paul A	CGC
Sullivan, James L	CGC
Schroeder, John, Jr	PWM
Stenson, Irving C	CGC
Stolz, Alexander F	CGC
Souza, William B	PWM
Schell, Harold W	PWM
Steever, Edgar Z	DMA
Speck, Frank C., Jr	PWM
Staples, Julian P	CGC
Schock, William O	PWM
Sharer, Donald B	TFT
Smith, Andrew R	EOT
Schotten, Marcellus J	CJW
Schaper, Lawrence C	CJW
Shankle, Warren C	PWM
Salisbury, Earle E	CGC
Sandlin, James H	CGC
Schoonmaker, Earle W	CGC
Shropshire, Noble S	CGC
Shafskey, Aloph Frederick	SLA; ABC
Shuman, Fred W	CGC
Simons, Ralph J	CJW
Stokes, Charles P	DMA
Shreve, Emory Harold	SLA; VBW
Schaf, Joseph C., Jr	GLC
Shackleton, Edwin Rockingham	FLA
Suffridge, Clarence Edgar	FLA
Scott, Neal J	PWM
Stevens, John H	FRF
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Snyder, Lawrence N	TFT
Sheppard, Charles W	Note 7
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Simpson, William D	DMA
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Small, Sidney F	KST
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Scherck, George B	SLA; EOT
Staley, Walter J	TMA
Schick, Herbert M	PWM
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Stuckey, Arthur R	PWM
Sleight, Reuben Benjamin	FLA
Schmitt, John R	CGC
Sessions, Henry F	CGC
Stevennson, Norman M	CGC
Smilie, Robert S	PWM
Sevey, William B	LHV
Smith, Hugh Neely, Jr	CPA
Seward, Leon Edward	EOT
Shrader, Myron R	CGC
Surber, Wilfred A	Note 6
Sachers, Gustave E	CJW
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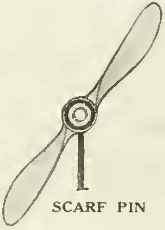

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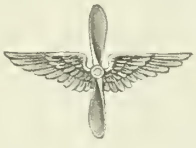

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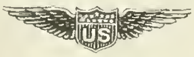
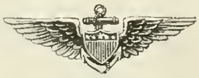


A. V./2



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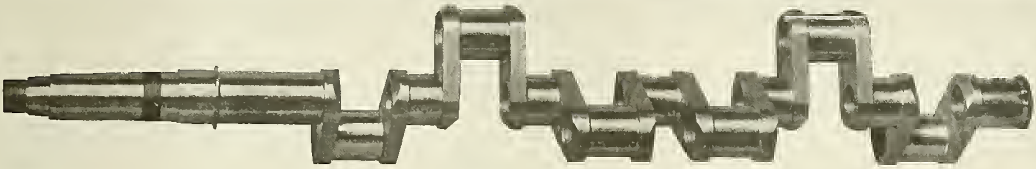

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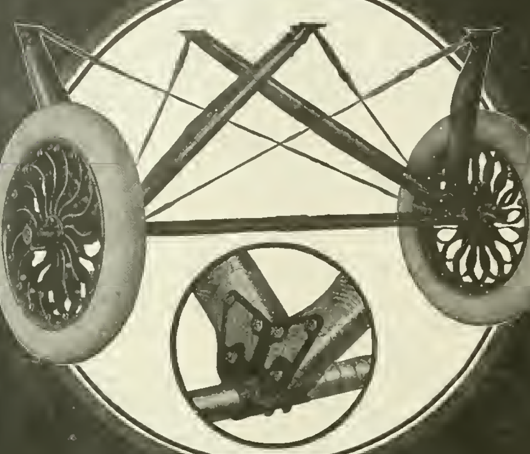

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Wiedersum, Roy	WFO
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Wentworth, Harry D.	EOT
Wolf, Harry J.	EOT
Stead, George Sheldon	SLA; BFT
Willinger, Leo M.	FRF
Warwick, Stanley John	SLA; SAG
Welcb, St. Clair Duval	SLA; DAF
Wilcox, Ralpb Willard	SLA; BFT
Weed, Frank Josepb	SLA; BFT
Willett, Albert B.	EOT
Whitmire, John T.	HHN
Ward, Allen Bryan	SLA; SBI
Wahle, Carl Budd	SLA; TMA

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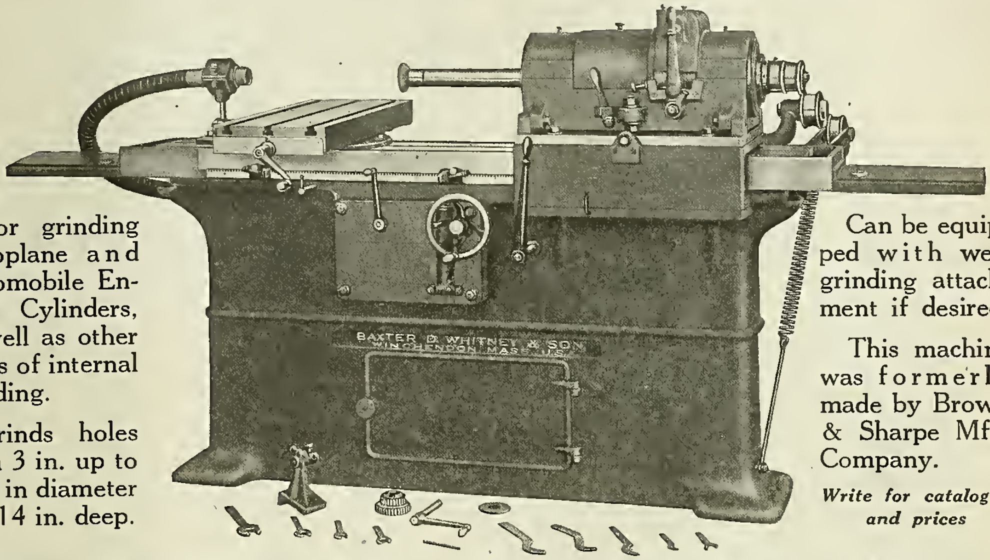
Cylinder Grinding Machine



For grinding Aeroplane and Automobile Engine Cylinders, as well as other kinds of internal grinding.

Grinds holes from 3 in. up to 7 in. in diameter and 14 in. deep.

Can be equipped with wet-grinding attachment if desired.

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Canadian Agents: Canadian Fairbanks-Morse Co., Montreal, P. Q. Foreign Agents: Buck & Hickman, Ltd., London, England. Fenwick Freres Co., Paris, France.

(*Continued from page* 317)

Tail Group

The control cables to the upper elevator tillers pierce the stabilizer. The covering around these holes is then reinforced with leather washers to prevent wear. The fin is larger than was employed on the KB-2T. The stabilizer is braced with seamless steel tubing, the fin and rudder post with cable. Tillers are made of sheet steel welded to a steel plate. The elevator flaps and rudder are so constructed so as not to allow a space between them and members to which they are hinged, when their positions are changed. Tail measures 10′ 4″ x 3′ 2″. Elevator flaps 3½′ x 2½′.

Landing Gear

Regular "V" shape, with struts connecting to the body at points in line with front and rear wing spars. The tread is 5′ 3″ and wheels 26″ x 3″ are covered with linen covering "doped".

The landing gear is strongly braced with heavy stranded cable. The yoke for axle and plates for fastening to the fuselage are made of heavy sheet steel. The axle is nickel steel tubing 1½″ diameter with a ¼″ wall.

Elastic cord is used for absorbing the landing shocks.

Engine Group

A regular Curtiss O X rated at 100 h.p. is used, with a two-bladed Lang propeller 8 feet in diameter and 5 feet 4 inch pitch.

One fuel tank with a capacity of 30 gallons is mounted just behind the engine.

A Mayo radiator 3″ deep with a frontal cooling surface of 210 square inches is used. It weighs 53 pounds empty and holds six gallons of water.

Aeroplane Construction and Operation

In this book the author has succeeded in compiling an exceptional amount of invaluahle material for the instruction of students, as well as for ready reference of the technical man and aeronautic engineer.

It is written in simple, concise language, starting with the most elementary principles of flight and explaining the construction of the aeroplane, finishing with the most complete calculations for the surfaces, power, weight, etc.

The following is a partial list of contents:

1. 429 pages. Up-to-the-minute data on construction, operation and calculations on aeroplanes. Dimensions and data on well-known machines.
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3. A glossary defining the latest aeronautical words and terms with their French equivalents.
4. Lifting surfaces, aerodynamic calculations, streamline hodies. etc.
5. Training and operating, explaining operation of control systems and methods of training students.
6. Military aeroplanes.
7. Tahles of dimensions, with characteristics, weights, performance, etc.
8. Types of construction, arrangement and details.
9. Power, weights estimates, and general notes on the design.

This hook is well illustrated with photographs, tables, diagrams and charts.

There is also a detailed diagram of a Blimp or scouting dirigihle, with a key to the diagram, giving the names of the parts.

This book contains a large folding chart, giving a drawing of the de Haviland 4, also drawings showing the methods approved hy the Government for handling the machine while "looping the loop," doing the "Immelmann turn," and other "stunts."

Aeroplane Construction and Operation by John D. Rathhun. Price $2.20, postpaid, from Aeronautical Library, 299 Madison Avenue, New York.

To Increase Officers' Pay

In the Senate of the United States on September 24, 1918, Mr. Penrose introduced the following bill, which was read twice and referred to the Committee on Military Affairs.

A hill to increase the rates of pay of officers of certain grades.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That hereafter the current yearly pay of officers of the Army of the several grades herein mentioned, exclusive of longevity pay, shall he as follows: Colonel, $4,500; lieutenant colonel, $4,000; major, $3,500; captain, $2,900; first lieutenant, $2,500; and second lieutenant, $2,200: *Provided,* That in no case shall the pay of a colonel exceed $5,500; the pay of lieutenant colonel exceed $5,000, or the pay of major exceed $4,500.

Sec. 2. That all laws and parts of laws in conflict herewith are hereby repealed.

(*Continued from page* 344)

Wyhrant, Rolla Hugh	SLA; ABC
West, Conrad Riley	SLA; CWT
Wentz, Alan William	SLA; MAC
Witt, Joseph B	PWM
Williams, Le Roy	SLA; CWT
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Wright, Bailey A	WFO
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Wyatt, John A	WFO
Williams, Richard E	CGC
Wood, Harry Sechler	SLA; SAG
Woodward, Irving J	PWM
Witsell, Frederick C	PWM

Y

Young, Evan Dale	SLA; BFT
Young, George Joseph	SLA; GLC
Yale, Donald Lewis	SLA; FOB
Young, Henry M	CGC
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Yerkes, William Dilworth	SLA; CFT
Youngs, Grover A	CGC
Yount, Barton K	DIK; WDM; Note 1
Yager, Frank R	CWT
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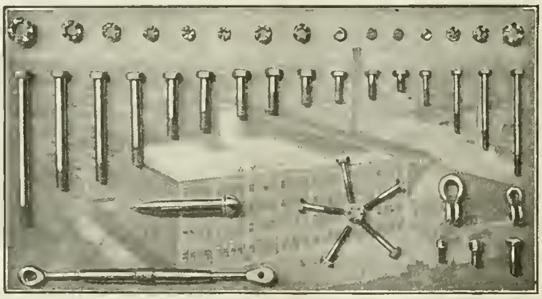

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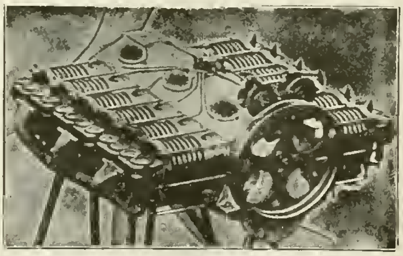

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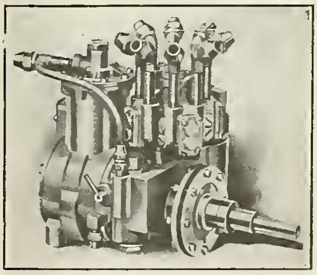

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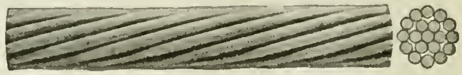

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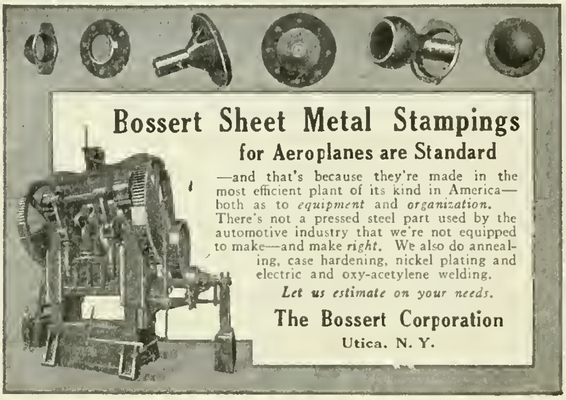

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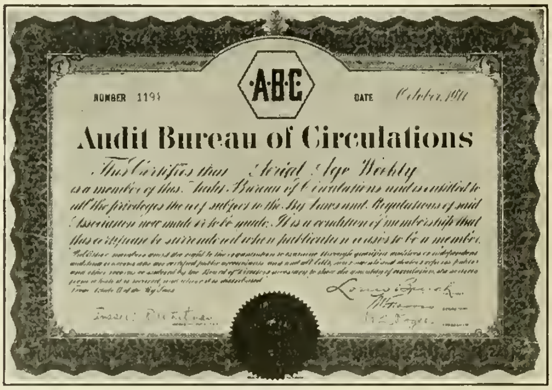

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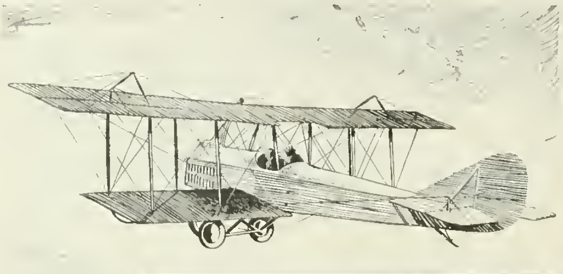

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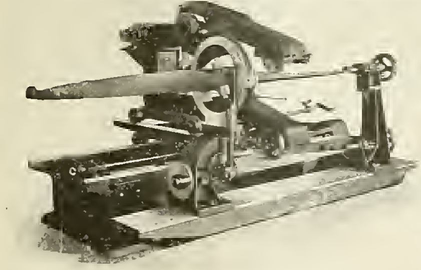

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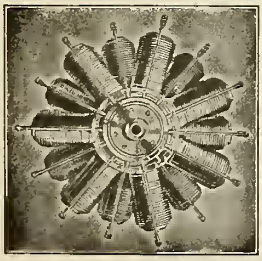

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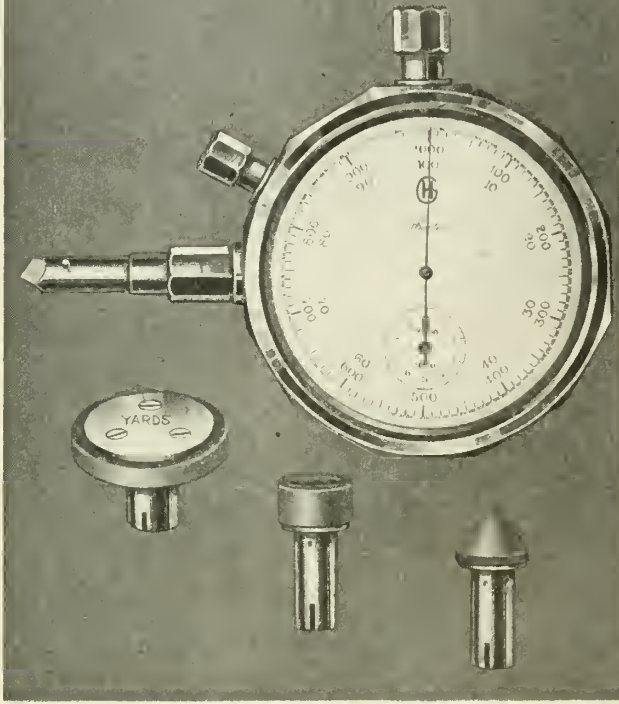

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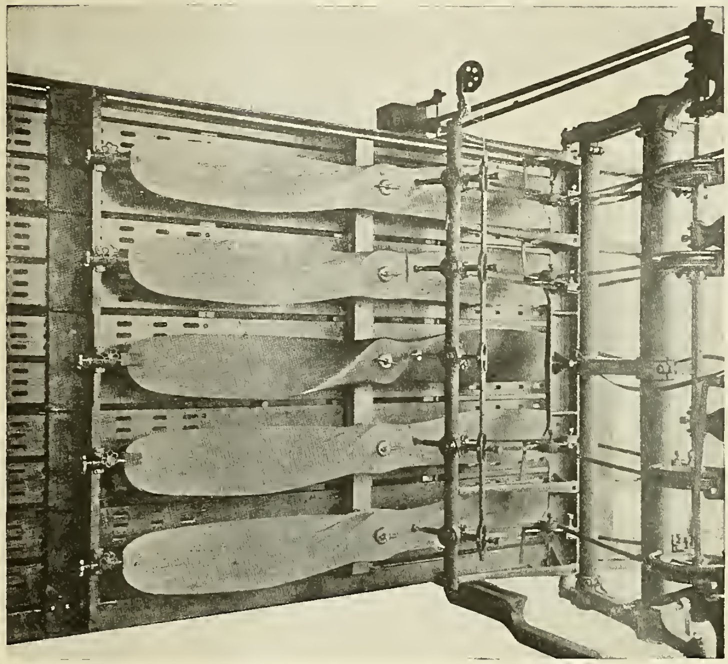

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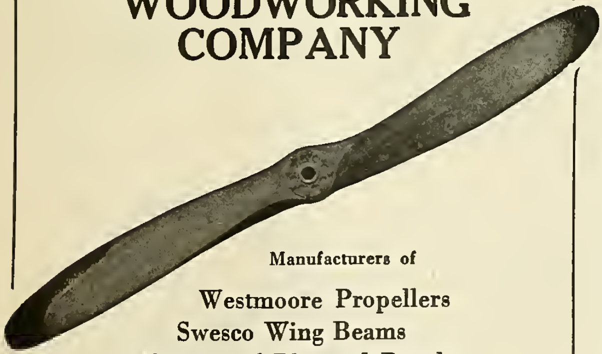

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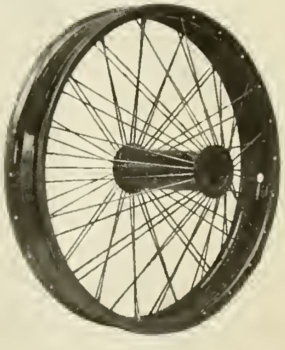

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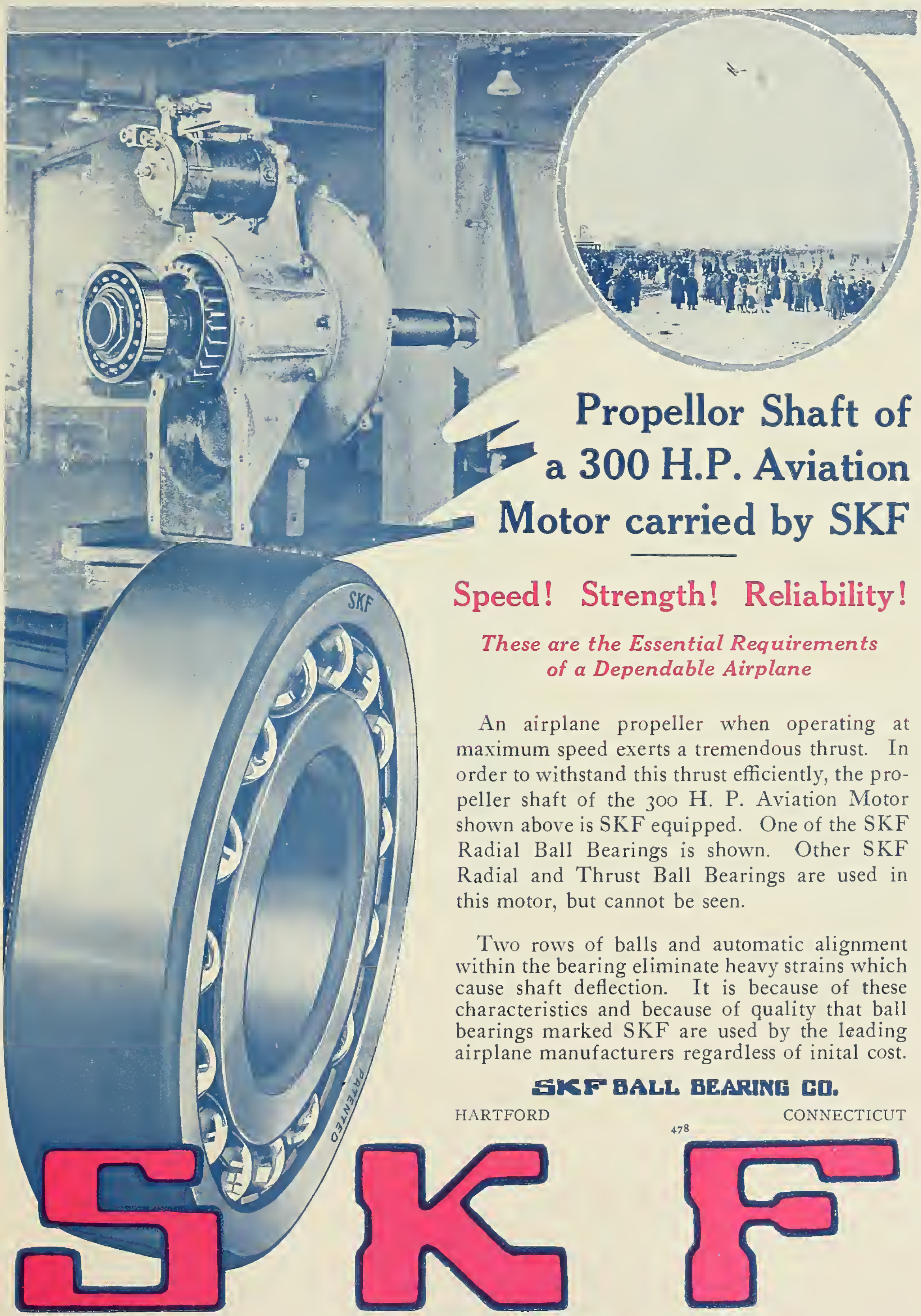

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